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Chapter 51
STRUCTURES - GENERAL

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STRUCTURES GENERAL

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CHAPTER 51

STRUCTURES - GENERAL

1. General - Description and Operation

The airplane structure is designed to maintain the required static strength, and provides optimum structural safety from fatigue and fail-safe standpoints. Multipath structure is used in major components and attaching structure, and low normal operating stress levels are maintained. Figure 1 shows an exploded view of the airplane structural components. 2024 aluminum alloy is used in some areas because of its superior tear-resistant properties and where structural loadings are primarily of the tension type. 7075 aluminum alloy is used where structural loadings are primarily compression and bending.

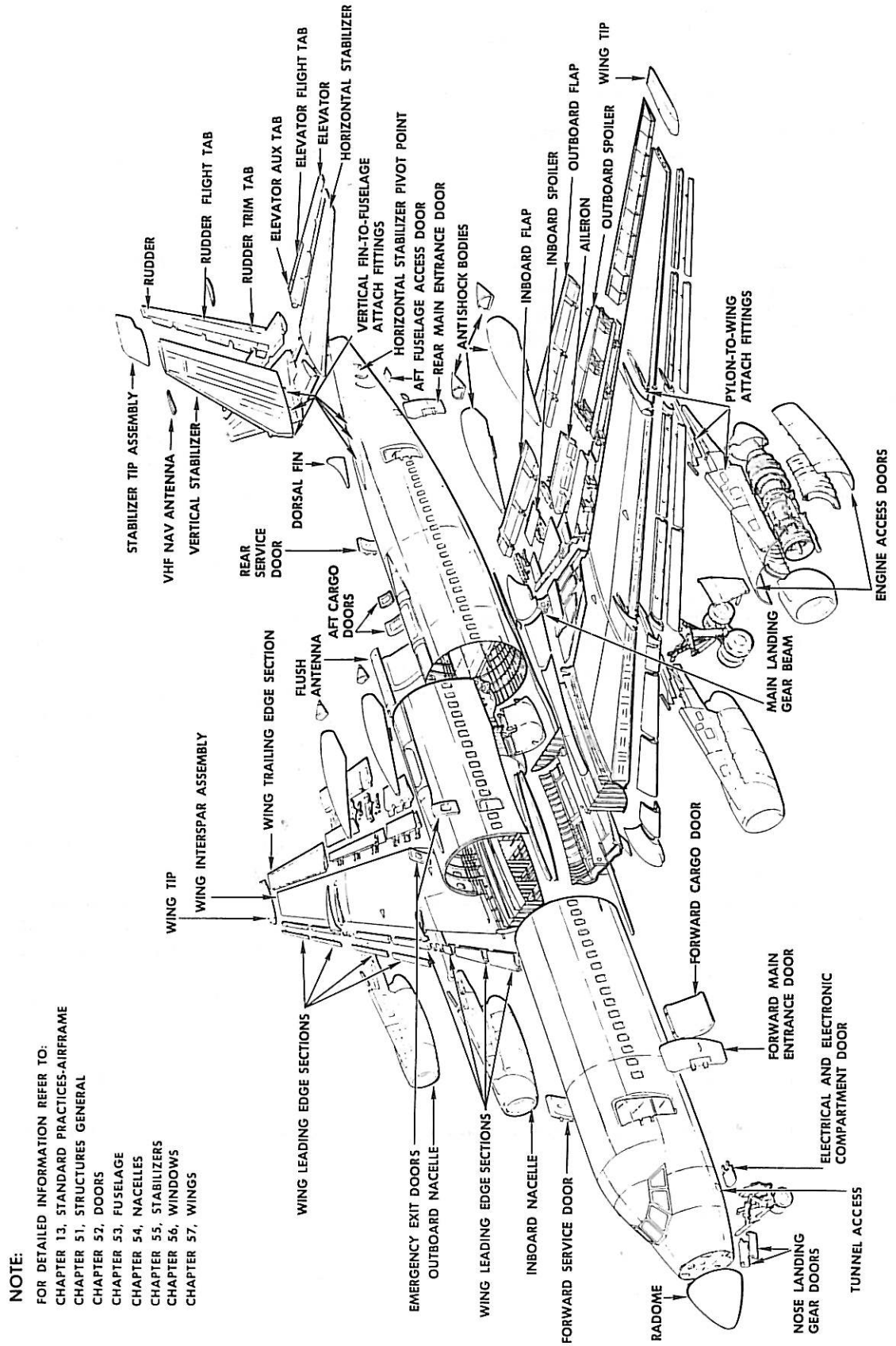
2. Fuselage

The fuselage is designed for an operating pressure of 8.2 psi, and includes a flight compartment, passenger cabin, lavatory and buffet areas, and equipment and cargo compartments (see Figure 2). The forward and aft cargo compartments, equipment compartments and the main landing gear wheel wells are located below the passenger cabin floor. The nose gear wheel well is located under the flight compartment. The forward pressure bulkhead is located at the forward end of the nose wheel well at station 152; the aft pressure bulkhead is located at the aft end of the passenger cabin at station 1487. The fuselage afterbody (aft fuselage section) is located aft of the aft pressure bulkhead and contains the horizontal stabilizer actuating mechanism and attachments for the empennage. An unpressurized solid-laminate radome is mounted forward of the forward pressure bulkhead. An antenna housing is installed along the top centerline of the fuselage from station 700 to 1230.

Basically, the fuselage is a semi-monocoque structure containing transverse beltframes and longitudinal stiffeners with an aluminum alloy skin. Heavy skin gages are used, thus reducing the number of longitudinal stiffeners required. Longitudinal stiffeners are not used in the region extending from forty inches above the top of the cabin windows to fifteen inches below the bottom of the cabin windows. Below the wing center section tie-box a deep keel provides fuselage bending area continuity.

A. Cabin Windows.

Passenger cabin windows are located in each bay between the beltframes in the region aft of the forward main entrance door and forward of the rear main entrance door. Each window is about 12 x 16 inches



NOTE:
FOR DETAILED INFORMATION REFER TO:
CHAPTER 13, STANDARD PRACTICES-AIRFRAME
CHAPTER 51, STRUCTURES GENERAL
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CHAPTER 53, FUSELAGE
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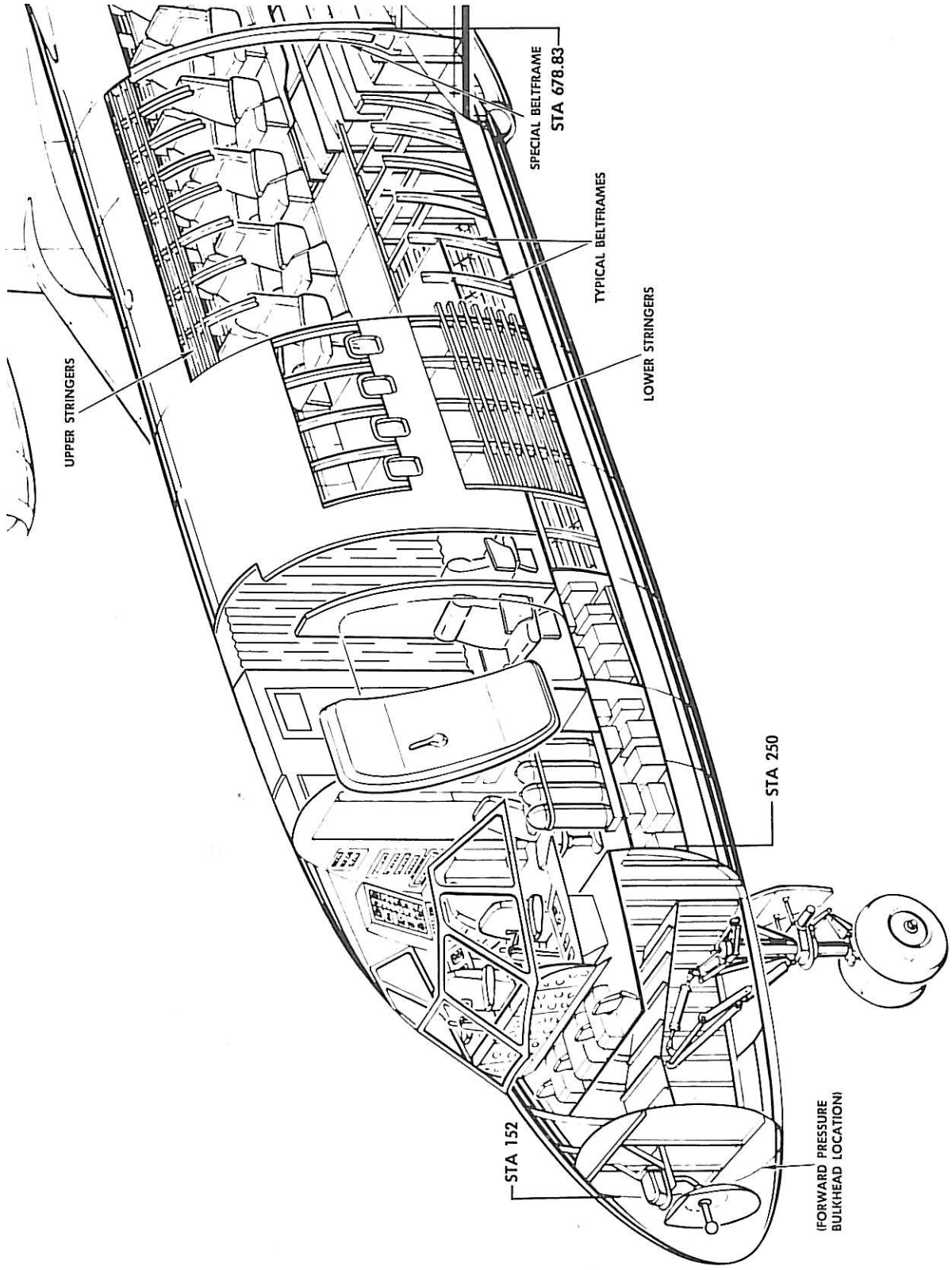
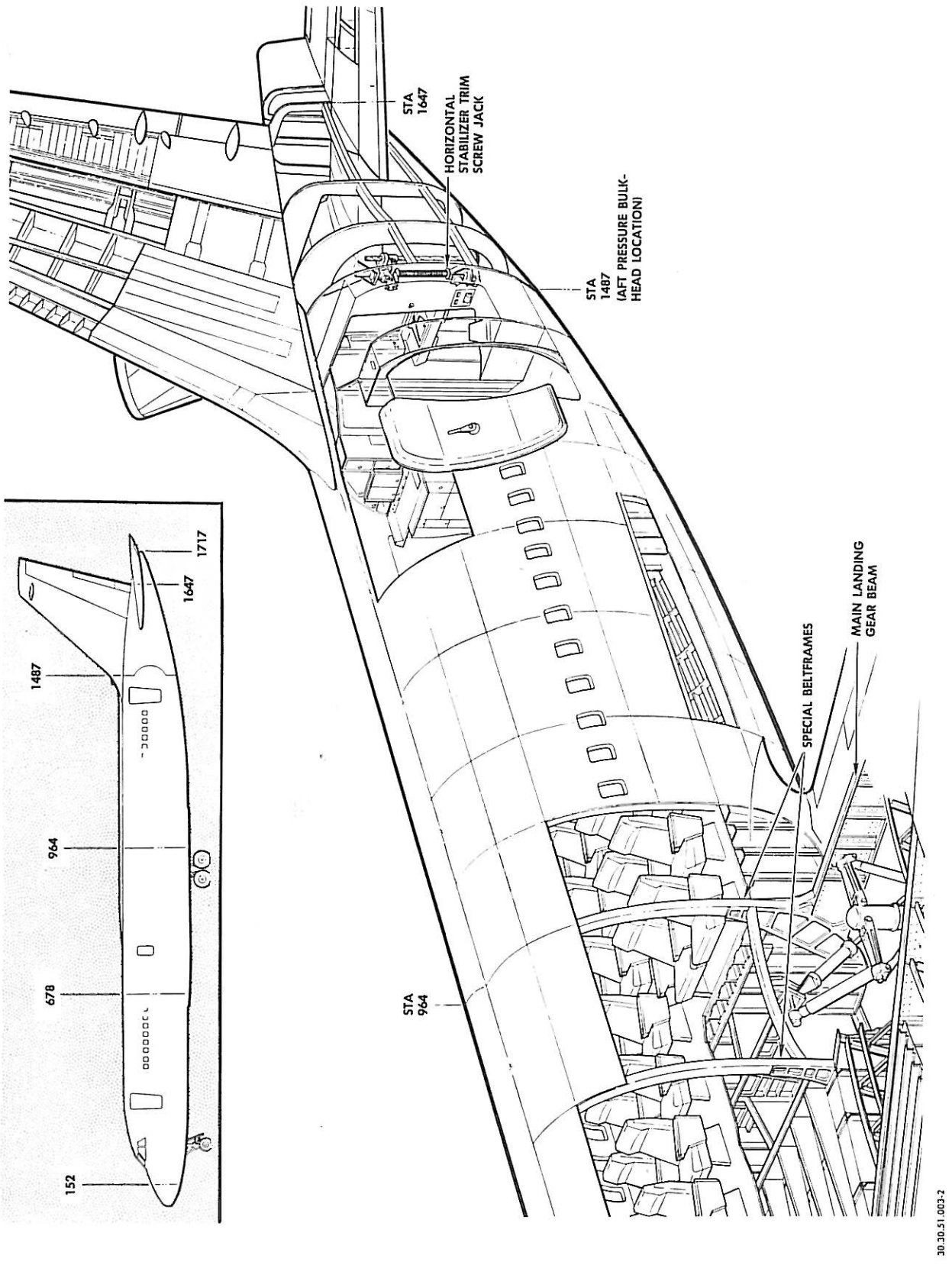
Airplane Structural Components
Figure 1



Fuselage Layout and Construction
Figure 2 (Sheet 1 of 2)



Fuselage Layout and Construction
Figure 2 (Sheet 2 of 2)

in size. These windows are of a double-safe design using three thicknesses of plexiglass mounted in a strong forged aluminum alloy frame. This frame is riveted directly to the fuselage skin. No stringers or longerons are needed to reinforce the cutout, nor does the window frame attach to the adjacent beltframes. The window frame forging is sufficient reinforcement for the window cutout in the fuselage skin.

B. Entrance and Service Doors.

Two main entrance doors, about 30 by 74 inches are in the left side of the passenger cabin - one forward and one aft of the wing. These doors move upward to clear the vertical closure tracks, then swing outward and away from the entrance. They may be opened from either outside or inside the cabin. Two service doors, about 24 by 48 inches in size, are located in the right side of the fuselage, one forward at station 413 and one aft at station 1376, and operate similar to main entrance doors. One over-wing emergency exit is located on each side of the fuselage between stations 715 and 739. The emergency exits are opened from the interior by pulling down on a hinged guard, then pulling the release "T" handle. The exits can be opened from the exterior by pushing on the release plate that is flush with the exterior skin.

C. Cargo Compartment Doors.

Inward opening, sliding doors are located in the right side of the fuselage for access to the cargo areas below the passenger cabin floor. These doors are of conventional rib and skin construction with pressure seals around their outer edges.

D. Nose Section.

The nose radome is a solid-laminate, fiberglas structure that is attached to the fuselage at the forward pressure bulkhead. The fuselage jacking point is also located at the bottom centerline of this pressure bulkhead. A pair of beams extend aft from the forward pressure bulkhead to form the sides of the nose wheel well. Large forged fittings are attached to these beams on each side and contain the forward and aft nose gear trunnions.

E. Flight Compartment.

The flight compartment enclosure contains heavy machined longerons, machined window posts and five-ply laminated glass. The upper longeron is continuous from one side of the fuselage, forward around an arc above the windshield, and back along the opposite side. It forms a horseshoe-shaped assembly to which the upper ends of the window posts

attach. A lower window longeron extends around the lower edge of the flight compartment windshield. Vertical posts, frames and a heavy transverse member under the windshields complete the main load carrying structure. Resistance to bird impact and internal and external pressure loads are the criteria for design of the flight compartment structure and glass. Electrofilm for anti-icing and anti-fogging is included with the intermediate laminates of the windshields; electrofilm for anti-fogging only is included in the side windows. A sliding window is located on each side of the flight compartment. There are two floor levels in the flight compartment area, the forward level being elevated for the pilot's and copilot's seats. Both floor levels are of stiffened aluminum alloy sheet supported by transverse floor beams.

F. Cabin Area.

The basic structure in the constant section of the fuselage (the area housing the passengers, cargo, buffet service, etc.) is comprised of skin panels, upper fuselage stringers, lower fuselage stringers, beltframes and floor beams. The cabin floor does not contribute greatly to the overall fuselage strength.

A typical beltframe in the constant section is a roll-formed Z-section, formed from 0.050-inch thick aluminum alloy sheet material and is three and one-eighth inches deep. A typical floor beam in this area is about six and one-half inches deep and is composed of upper and lower extruded tee caps and a stiffened web. In the regions where stringers are used, the typical beltframe is connected to the skin with an intercostal which is notched to pass the stringers. Typical stringers in the constant section are extruded Z-shaped sections that are seven-eighths of an inch deep.

The beltframes in the cabin area are spaced approximately 19 inches apart. The stringer spacing in this area varies somewhat with a minimum stringer spacing of approximately six inches and a maximum spacing of approximately nine inches. Highly loaded portions of the passenger cabin, such as the wing attachment section, the areas around large cutouts, etc., have special beltframe installations and additional longitudinal members.

The aft pressure bulkhead at station 1487 is a built-up frame and stiffened web structure incorporating a large pressure dome. The vertical stabilizer center spar also attaches to this pressure bulkhead. In general, the construction of the aft fuselage section or afterbody is similar to the overall cabin structure.

The cabin floor is of aluminum core honeycomb construction with sheet aluminum alloy faces. Two built-up cap and web beams extend the length of the passenger cabin forward and aft of the wing center section

tie-box. These two beams carry the passenger seat loads and also stabilize the transverse floor beams in the fore and aft direction. The inboard seat attachments are installed in a hat-section over these longitudinal beams. These hat-sections also serve as a longitudinal splice for the cabin floor panels.

Many different aluminum alloys are used in the fuselage structure. All of the fuselage skin is 2024 aluminum alloy. Most of the stringers, structure around cutouts, and other highly loaded regions are also 2024 aluminum alloy. The use of 7075, 7079, and 7178 material is limited to parts which are not considered fatigue critical. Fatigue critical forgings are made of 2014 aluminum alloy.

3. Wing

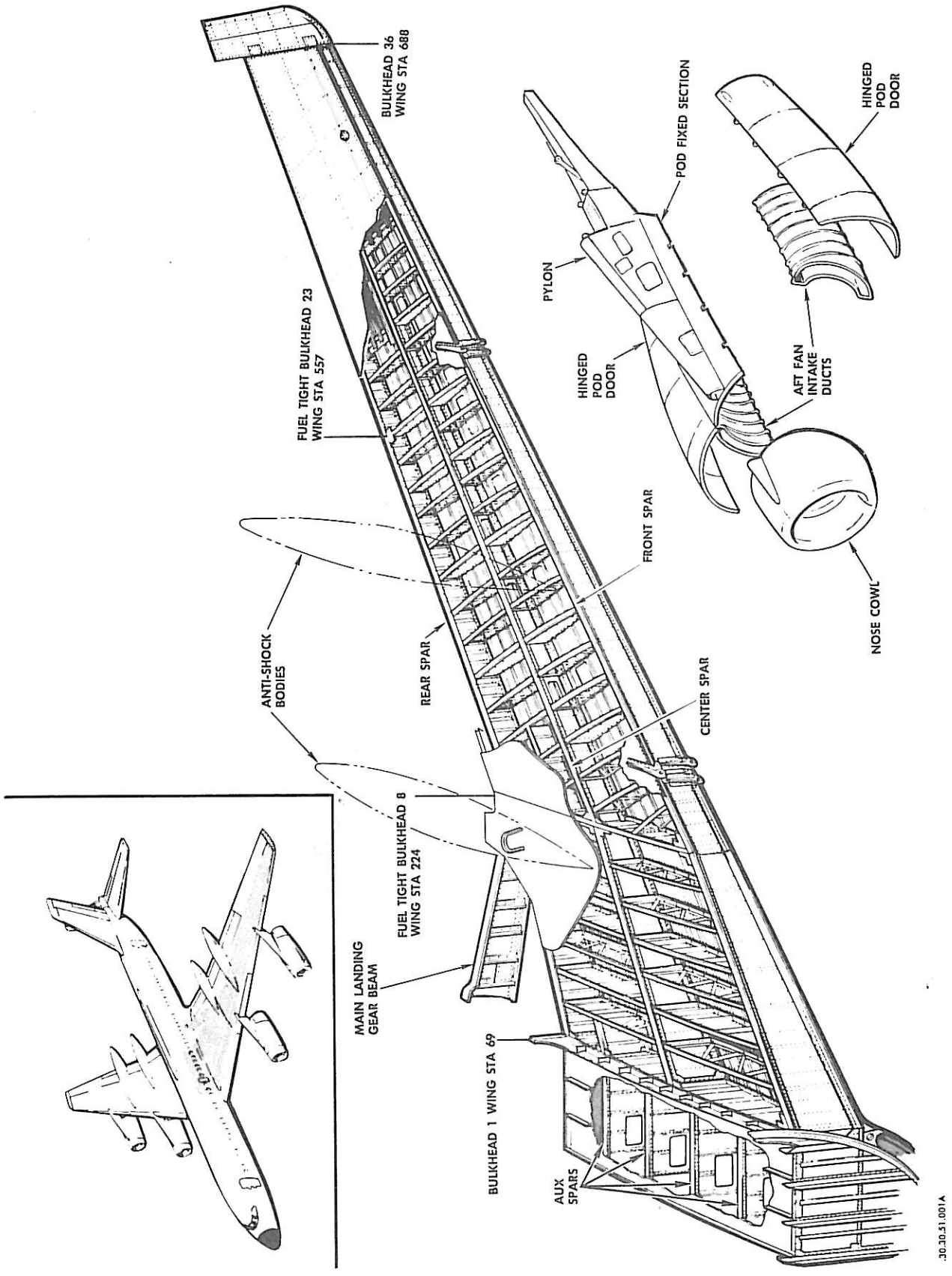
Three main spars, four center section tie-box auxiliary spars and a main landing gear beam, along with plate-stringer skin panels and ribs constitute the wing primary structure. This interspar box beam (see Figure 3) is the primary bending and shear structure. It supports the pylons that carry the turbojet engine pods, the flaps, ailerons, spoilers, anti-icing leading edge assembly and the trailing edge structure. The main landing gear beam houses the aft main landing gear trunnion near its inboard attachment to the fuselage. This beam also supports the inboard flap, inboard spoiler and inboard trailing edge panels.

A. Wing Spars.

The three main wing spars are of conventional, built-up, stiffened web and rail construction. The webs are tapered spanwise in some areas, and the rails are made of mill-tapered extrusions. The front spar, except for splices, is continuous from one wing tip to the other and contains the forward pylon attachment fittings. The chemically-etched leading edge section between the outboard nacelle (pod and pylon) and the fuselage is attached to the upper front spar rail with steel hinge pins and to the lower front spar rail with screws. The wing leading edge section between the outboard nacelle and the wing tip is attached with screws in both the top and bottom front spar rails.

The center spar is similar in construction to the front spar, except that it eliminates the web in the wing center section tie-box and the spar rails reduce to stringers in this area. The center spar web also terminates just outboard of the outboard pylon. The rear support fittings for the inboard pylons are also located on the center spar lower rail.

The rear spar is similar in construction to the front spar and, except for splices, is continuous through the fuselage. This spar supports the flaps, ailerons, and spoilers which constitute the trailing edge



Wing and Pod-Pylon Structure
Figure 3

structure. It also carries the main landing gear forward trunnion and the outboard pylon rear support fittings. The outboard end of the main landing gear beam attaches to the rear spar at the splice located just inboard of the inboard pylon at wing station 224. Two machined, stretch-straightened 7079 aluminum alloy plates are used in this landing gear beam--a short one at the outboard end and a larger section at the inboard end. The inboard section of the beam connects to the fuselage through two integral lugs. The remainder of the main landing gear beam is of the conventional web-cap design and is constructed of 7075 aluminum alloy.

B. Wing Center Tie-Box Section.

The wing center tie-box section consists of four auxiliary spars at equal chordwise intervals, plus a series of fore and aft beams in combination with the front and rear spars. The upper fore and aft beams and plating form the lower side of the fuselage pressurized area. The passenger cabin floor attaches directly to these beams, thus eliminating transverse floor beams in the fuselage beltframes in this area.

There are two main attachments of the wing center section tie-box to the fuselage bulkheads at the front and rear spars. In addition, dagger-type splices are employed between the intermediate beltframes and the wing center tie-box section. A drag angle connected to the fuselage "canoe" section splices the wing lower skin to the fuselage.

Fuel is carried in the wing center tie-box section in five rubber impregnated nylon cells. The cells are laced into position with nylon cord. The interspar assembly outboard of the fuselage is an integral fuel cell divided by fuel-tight bulkheads and the wing center spar into four cells per side.

C. Splices.

Wing spar splices are located on each side of the fuselage at a point just inboard of the inboard pylon and at the airplane centerline. The wing skins are spliced chordwise inboard of the outboard pylon and at the wing spar splice locations. A spanwise skin splice extends inboard along the center spar upper and lower rails from the outboard chordwise skin splice to the fuselage.

D. Wing Ribs.

Wing ribs are of both the web and truss types. Web-type ribs are used in areas where support for the pylons, hinges for the flight control surfaces, etc., require additional strength. The web-type ribs also provide protection from fuel surges. The rib rails connect to the outer skin through intercostals where the ribs cross or meet the main

spars. Intercostals are extruded tees that attach the wing skin to ribs in areas that have high concentrated loads from pylons, flaps, and ailerons. Full intercostaling is used on surge bulkheads in the inboard portion of the wing. This is a fail-safe measure for shear redistribution in the event of spar web failure.

E. Access Doors.

Access doors are located in the lower surface of the main spar box. A single row of doors is located along the bottom centerline of the wing from the tip inboard to the outboard pylon. Two rows of doors are located inboard of this point, one in each interspar box. These doors are a structural part of the wing; the cutouts for each door installation are reinforced with tapered and tabbed doublers to reduce stress concentrations to a minimum.

F. Wing Materials.

Aluminum alloys used in various portions of the wing structure are as follows:

Structural Part	Alloy and Type
Upper surface skin	7075 and 7178 sheet and plate
Lower surface skin	2024 sheet and plate
Upper surface stringers	7178 extrusions
Lower surface stringers	2024 extrusions
Lower main spar rails	2024 extrusions
Upper front spar rail	2024 extrusions
Upper center spar rail	7178 extrusions
Upper rear spar rail	7178 extrusions
Spar webs	7075 sheet

The remainder of the primary wing structure is 7075 aluminum alloy sheet or extruded material, except for the forged fittings which are 7079, 7075, or 2014. The 2014 material is used in fatigue-critical areas. The trailing edge structure which attaches to the rear wing spar outboard of the flaps consists of one-half inch thick 2024 aluminum alloy-faced honeycomb panels on the upper and lower surfaces and internally stiffened by formers.

G. Control Surfaces.

The flaps incorporate 2024 aluminum alloy-faced honeycomb panel skins with internal stiffeners, and are supported by steel tracks attached to the wing rear spar. Three tracks support the outboard flap and two tracks support the inboard flap on each wing.

*Applicable to Group I airplanes; slats are installed on the leading edge of the wing between the inboard and outboard pylons and outboard of the outboard pylon. Two tracks support each slat. Basic slat structure is of aluminum alloy.

Applicable to Group I airplanes; leading edge flaps are installed on the lower surface of the inboard leading edge section of each wing. Applicable to Group II airplanes; leading edge flaps are installed on the lower surface of all leading edge sections of each wing. Each flap section fits flush with the wing leading edge contour when retracted and extends down and forward to the extended position. The flaps are hinge mounted to the forward portion of the leading edge section and are operated by a flap drive assembly. The flaps are of the conventional rib and skin construction using aluminum alloy.

The ailerons are of conventional rib and spar construction with aluminum honeycomb skin panels on the upper and lower surface. They are attached by hinges to aluminum alloy forged ribs on the rear spar. The aileron is of the "balance board" type and has trim and control tabs.

Forward of each inboard and outboard flap are the upper surface spoilers. These spoilers are hydraulically operated and can be used together for speed brakes, or separately to aid aileron control. The spoilers are full-depth 2024 aluminum alloy-faced honeycomb and are about three inches thick at the heaviest section.

H. Wing Sealing.

Sealing of the main wing spar box for fuel-tight purposes is accomplished by the use of Scotchweld tape on all faying surfaces. The complete wing box is then baked in an oven, thus making a metal-to-metal bond which is unaffected by fuel. The complete main spar box, except for the region adjacent to the centerline splice, is treated in this manner.

I. Anti-Shock Bodies.

Two anti-shock bodies are installed on the upper surface of each wing, parallel to the fuselage at wing station 204 and wing station 407 to delay the formation of shock waves on the wing and to provide additional fuel storage. Construction is of conventional built-up type employing 2024 aluminum alloy skin and frames. The lower skins are honeycomb construction. Scotchweld prime and tape is placed between all faying surfaces before the assembly is riveted. After riveting, the entire assembly is placed in an oven and baked to cure the scotchweld prime and tape.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

1. Empennage

The empennage consists of the horizontal and vertical stabilizers, the elevators and the rudder (see Figure 4). The entire horizontal stabilizer is a movable surface and is used for longitudinal trim control. The horizontal stabilizer is attached to the fuselage at two hinge or pivot points on the rear spar and by its actuator screw jack on the front spar.

A. Horizontal Stabilizer.

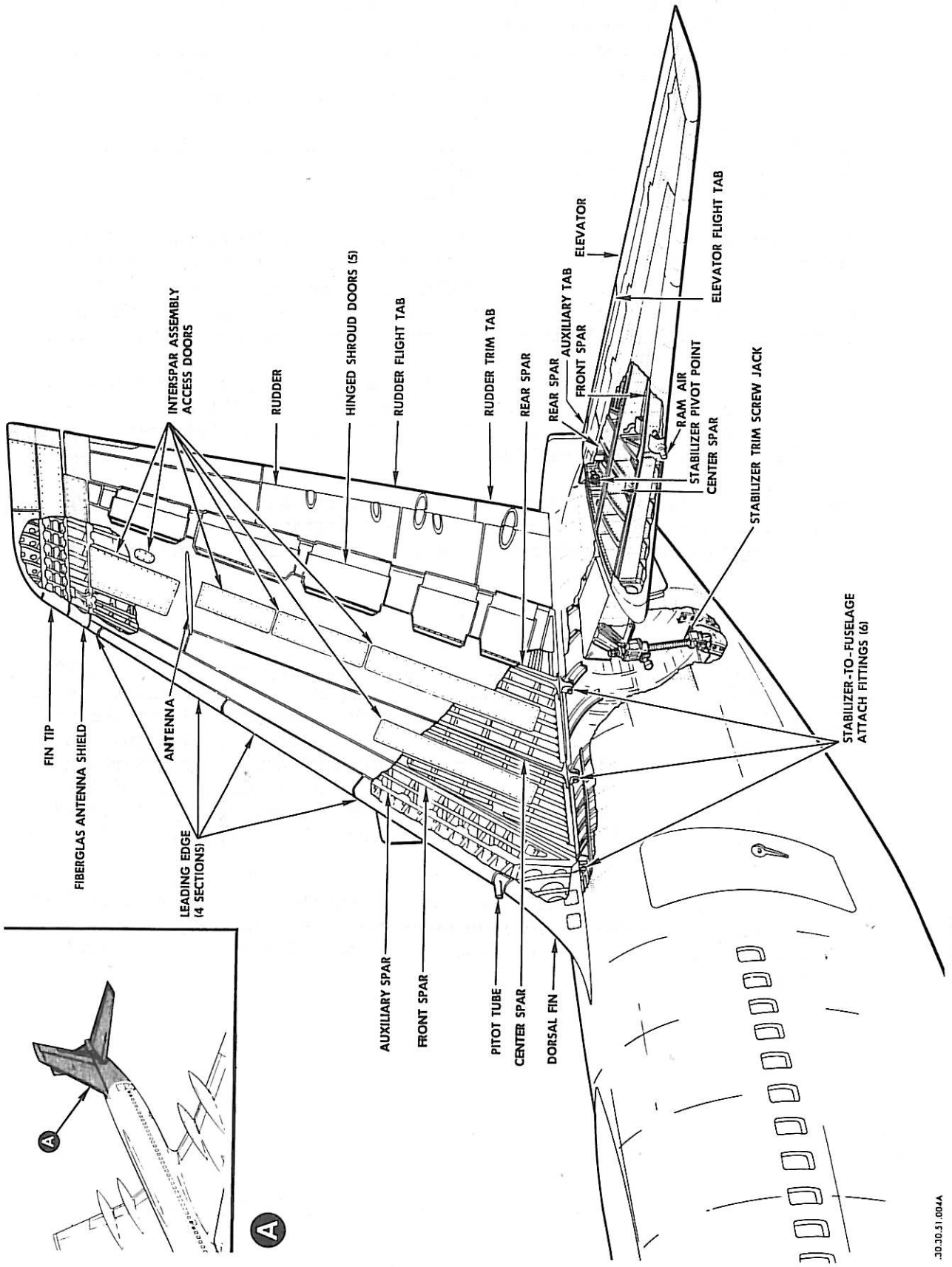
The horizontal stabilizer assembly consists of a left and right section and a center torque box. The left and right sections are of three spar, plate stringer, box beam design and construction. The left and right sections can be detached from the torque box by removing bolts from fittings at the front and rear spar. The electrically de-iced leading edges, elevators and elevator shrouds are attached to the primary structure. The stabilizer spars are of conventional built-up cap and web structure. Ram air duct installations are installed in the leading edge to de-ice the inboard balance board area for the elevators. The rear spar supports the elevator shrouds and elevators. A total of six hinges support each elevator. Web-type ribs are used at hinge locations. Truss-type ribs are used at other rib stations.

The lower surface stringers and lower surface skin are made from 7075 aluminum alloy material; the upper surface skins and stringers are 2024 aluminum alloy. Both 7075 and 2024 aluminum alloy are used in spar and rib construction. The shrouds are made of dynamically etched aluminum alloy material. The elevator structure consists of a single built-up spar, stiffened aluminum skins, and skins with doublers at the attaching locations.

The elevator flight tab is of aluminum honeycomb sandwich construction and is mounted in the elevator trailing edge. There is no interconnect between the left and right elevators, except through the flight tab control linkage. Access to the horizontal stabilizer is provided through structural "strip" doors in the lower surface outside of the fuselage, and on both the upper and lower surfaces on the inside of the fuselage.

B. Vertical Stabilizer.

The vertical stabilizer is a full-cantilever, three-spar, box-beam structure. The leading edge and rudder shroud assemblies, as well as the rudder itself, attach to the main structure. The detachable leading edge assembly is made of aluminum alloy sheet with nose rib stiffeners. It is attached at the 5.5 percent chord line to the overhanging stiffened skin of the main box structure. The auxiliary spar extends along the leading edge of the fin and is of conventional rail and stiffener construction. The front spar of the main box is a conventional built-up beam of 7075 aluminum alloy caps and 2024 aluminum alloy web; it is located at 12.6 percent chord line. The center spar, which extends for about one-third of the fin span and is parallel to the rear spar, is similar in construction to the front spar, except for the region approaching its upper extremity where the web is omitted


INTERSPAR ASSEMBLY ACCESS DOORS
RUDDER
HINGED SHROUD DOORS (5)
RUDDER FLIGHT TAB
RUDDER TRIM TAB
REAR SPAR
REAR SPAR
AUXILIARY TAB
FRONT SPAR
ELEVATOR
ELEVATOR FLIGHT TAB
RAM AIR
STABILIZER PIVOT POINT
CENTER SPAR
STABILIZER TRIM SCREW JACK
STABILIZER-TO-FUSELAGE ATTACH FITTINGS (6)
FIN TIP
FIBERGLAS ANTENNA SHIELD
ANTENNA
LEADING EDGE (4 SECTIONS)
AUXILIARY SPAR
FRONT SPAR
PITOT TUBE
CENTER SPAR
DORSAL FIN
A
A
30.30.51.004A

and it becomes a pair of stringers. The rear spar closes the box beam assembly at the 50 percent chord line. Built-up web and cap 7075 aluminum alloy construction is used in the rear spar. Web-type ribs are used at the rudder hinge attachment points and truss-type ribs at all other locations. A ten-inch wide fiberglas structure is installed near the tip and serves as an antenna insulation. The removable tip assembly is of aluminum alloy construction. An external blade-type V.H.F. navigation antenna is installed about six feet below the top of the vertical stabilizer (water line 311).

The covering of the vertical stabilizer box is 7075 aluminum alloy. Structural "strip" doors, antenna doors and interior access doors are provided on the left side in both interspar skin bays. A set of aluminum honeycomb shrouds attach to the rear spar caps on both sides to cover the rudder balance boards and to act as an aerodynamic seal.

The rudder is of internally stiffened aluminum alloy construction. It has a single front spar box to which a honeycomb trailing edge covering is attached. Aluminum alloy honeycomb flight and trim tabs are attached to the rudder trailing edge.

Attachment lugs, at the lower end of each vertical stabilizer spar, splice into the spar cap structure. These fittings are 7079 aluminum alloy forgings and provide for shear bolt connection to the fuselage frames.

5. Nacelles

The turbojet engines are mounted in pods that are supported by pylons attached to the lower surface of the wing (see Figure 3). The pylons are of aluminum construction with steel fittings at the wing and pod attachment points. The pods are of aluminum, steel and titanium construction. The forward or nose cowl section is constructed of aluminum alloy inner and outer skins with formed aluminum alloy frames. The leading edge of the nose cowl contains hot bleed air anti-icing components. The pod's fixed section (integral with the pylon) is of aluminum alloy, steel, and titanium construction.

*Applicable to Group II airplanes; a movable translating cowl is installed aft of the thrust reverser to achieve aerodynamic smoothness of pod when thrust reverser doors are in the stowed position. The translating cowl is constructed of aluminum alloy.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

STRUCTURES - MAINTENANCE PRACTICES

1. Cleaning/Painting - General Airframe Cleaning

A. Equipment Required.

(1) Soft bristled brush.

(2) Castille or Ivory soap.

(3) Chamois, Specification KK-S-416, or equivalent.

(4) Solvent, Specification PS-1 (8475), or equivalent.

(5) Aero-Det A-202, Oakite Products Co. Inc., New York, N.Y.

B. Clean Airframe Exterior Surfaces.

(1) Apply solution of soap suds to the area, using soft brush.

(2) Scrub with brush until dirt and other foreign matter is loosened.

(3) Rinse with clean water.

(4) Dry the surface with a clean, damp chamois.

NOTE: If the preceding method does not remove all foreign matter, perform the following steps.

(5) Clean area with solvent or Aero-Det and soft brush.

(6) Rinse with clean water.

(7) Dry the surface with a clean, damp chamois.

2. Cleaning/Painting - Cleaning Plexiglas Windows

Refer to Chapter 56, WINDOWS, for plexiglas window cleaning procedures.

3. Cleaning/Painting - Appearance Control, Exterior Surfaces

A. These procedures are to be used to restore the exterior surface appearance when: Oxidation (chalking of paint coat) has changed the appearance from the original luster to lusterless; "yellowing" of white paint coat has changed the appearance from the original gloss white to lusterless yellow; Oxidation (light white powdering) of unpainted skin surfaces has changed the appearance from the original clad luster to lusterless.

B. Equipment Required.

(1) For procedure C:

(a) Brushes, mops, or spray equipment for application of cleaner.

(b) Several feet of cheesecloth or lint-free rags.

(c) Tape, moisture resistant, Buel-Town Co., San Diego, Calif.

(d) Waxed paper, Zellerbach No. 767 SWA-7885 (30-40), Zellerbach, Division of Shufford Mills, Hickory, N. C.

(e) Cee Bee Emulso-Clean No. 20, (an inhibited alkaline "soap and water" cleaner), Cee Bee Chemical Co. Inc., Downey, Calif.

NOTE: Aero-Det A202, Emulsion Cleaner, Oakite Products Co. Inc., New York, N.Y., may be used as an alternate.

(f) Cee Bee Easy Shine polishing pads, Cee Bee Chemical Co. Inc., Downey, Calif.

NOTE: Parko K-R Rubbing Compound, Parko Pacific Co., Gardena, Calif. may be used as an alternate.

(g) Johnson's No. 5015 Clear Wax Emulsion, Specification MIL-W-3688, Johnson's Wax, Special Industrial Products Dept., Racine, Wis.

(2) For procedure D:

(a) Rubber gloves and plastic face shields.

(b) Applicator brushes.

(c) Several feet of cheesecloth and clean dry lint-free rags.

(d) Aliphatic naphtha, Federal Specification TT-N-95a.

NOTE: TS-1 Cleaning Solvent, Shell Chemical Co. New York, N. Y. may be used as an alternate.

(e) Brolite 25 Cleaner Solvent, Andrew Brown Co., Los Angeles, Calif.

(f) Turco 3002 Brightener, Turco Products, Inc., Newark, N. J.

WARNING: THIS IS A PHOSPHORIC ACID COMPOUND; WEAR PROTECTIVE CLOTHING WHEN APPLYING.

(g) Cee Bee Easy Shine polishing pads, Cee Bee Chemical Co. Inc., Downey, Calif.

NOTE: Parko K-R Rubbing Compound, Parko Pacific Co., Gardena, Calif. may be used as an alternate.

CORROSION CONTROL - DESCRIPTION AND OPERATION

1. Corrosion Characteristics

When the airplane, constructed of many metals, is exposed to a corrosive environment (exhaust gases, moisture, waste water, spillage, etc.), all factors necessary for corrosion are present. In general corrosion is caused by chemical attack such as acid on metal, and by galvanic action which occurs between dissimilar metals in faying or adjacent surfaces. The various types of corrosion are as follows:

A. Uniform Etch Corrosion.

The surface effect produced by most direct chemical attacks (as by an acid, for example) is a uniform etching of the metal. On a polished surface this type of corrosion is first seen as a general dulling of the surface. If such corrosion is allowed to continue, the surface becomes rough and possibly frosted in appearance.

B. Pitting Corrosion.

The most common effect of corrosion on aluminum and magnesium alloys is referred to as pitting. It is first noticed as a white or grey powdery deposit, similar to dust, which blotches the surface. When the deposit is cleaned away, tiny pits or holes are observed in the surface. Pitting corrosion may occur in any type of metal or alloy.

C. Intergranular Corrosion.

Intergranular corrosion is an attack on the grain boundaries of a material and is identified on the surface by flakes. A highly magnified cross-section of any of the commercial alloys reveals the granular structure of the metal. It is seen to consist of quantities of individual grains. Each of these tiny grains has a clearly defined boundary which, from a chemical point of view, differs from the metal within the grain center. The grain boundary and grain center can react with each other like the two poles of a battery, when in contact with an electrolyte (conductive medium). Rapid selective corrosion at the grain boundary can occur.

D. Exfoliation Corrosion.

Exfoliation corrosion is a form of intergranular corrosion that exhibits itself by "lifting up" of the surface grains of a metal by the force of expanding corrosion products which occur at the grain boundaries just below the surface. It is a visible evidence of intergranular corrosion and is most often found on extruded sections where the grain thicknesses are usually less than in rolled forms.

E. Galvanic or Bimetal Corrosion.

Galvanic corrosion occurs when two different metals are connected or placed adjacent and then exposed to water or water containing dissolved salts. For example, aluminum and magnesium skins riveted together in an airplane wing form a galvanic couple. When aluminum pieces are attached with screws, galvanic corrosion can occur between the aluminum and steel in the presence of moisture. Contacts between certain metals tend to create corrosive action. Dissimilar metals are defined and grouped as follows:

Group	I	Magnesium alloys, aluminum alloys.
Group	II	Aluminum, zinc and cadmium and their alloys.
Group	III	Lead, tin, and steel except corrosion resistant steel.
Group	IV	Copper, nickel, silver, gold, chromium, titanium, cobalt and rhodium and their alloys, corrosion resistant steel, and graphite.

The metals within each group are not dissimilar in reaction and all metals not grouped together shall be considered dissimilar in reaction with respect to each other. The more widely spaced groups are considered the most dissimilar. Materials of any one group will suffer galvanic attack when in contact with materials of any other group in presence of moisture. The different metals within a group do not cause serious galvanic attacks when connected. Galvanic corrosion can usually be recognized by the presence of a buildup of corrosion products at the joint between two metals. Preventive measures include painting and plating. For example, steel bolts are cadmium plated to reduce the galvanic effects between steel and aluminum. The metals in contact are then aluminum and cadmium, which are not subject to serious galvanic attack.

F. Stress Corrosion Cracking.

Cracking of a metal caused by the simultaneous effects of both stress and corrosion is known as stress corrosion cracking. This type of corrosion is similar to intergranular corrosion in that it generally follows the grain boundary, but is different in that it is nearly a straight line through the metal structure and manifests itself as a crack in the metal and is not necessarily accompanied by obvious corrosion. The stress can be applied stress or one resulting from cold working of the metal without proper stress relief, such as preloading the part during installation. Stress corrosion cracking occurs on both aluminum and magnesium alloys. It is recognized only after the cracking has occurred, and this is usually too late to do anything except replace the part.

CAUTION: DO NOT NICKEL PLATE SURFACES OF ALUMINUM ALLOY PARTS (INCLUDING CONTROL TUBING) SUBJECTED TO FLEXING, IMPACT, TORQUE DEFLECTION, TOOL SLIPPAGE, NICKS, ETC. NICKEL PLATE IS FRAGILE. ONCE PLATING IS CRACKED, GALVANIC CORROSION WILL PROGRESS RAPIDLY ON THE ALUMINUM SURFACES, AROUND PLATING CRACK.

CORROSION CONTROL - MAINTENANCE PRACTICES

1. Inspection/Check - Corrosion Check and Evaluation

Unless proper checks and maintenance are performed, corrosion will occur regardless of the aids used. All portions of the airplane shall be carefully examined for signs of corrosion at each scheduled check period. Under certain conditions, such as high humidity and temperature or atmospheric conditions, due to geographic location, it may be necessary to increase the frequency of corrosion checks. Materials requiring special treatment to safeguard them against corrosion are those most subject to corrosive attack, and will require more careful attention and maintenance.

The first appearance of corrosion on unpainted aluminum alloy surfaces is in the form of white deposits or spots, especially around skin seams, lap joints, rivet heads, and areas where sand, dirt or grime collect, or in niches and crevices where traces of cleaning compound have been allowed to accumulate. Areas subjected to battery and lavatory fluids, smoke, exhaust fumes, and leading edges will require closer attention and more frequent maintenance.

There will be less corrosion on painted or aluminum clad surfaces than on unprotected surfaces; however, corrosion will sometimes occur on protected metal as moisture may permeate the protected surface. In such cases, the affected areas are generally identified by a scaly or blistered appearance, or sometimes by a discoloration of the paint.

Corrosion on aluminum and plated steel surfaces can often be recognized by dulling or pitting of the area and sometimes by white or red powdery deposits. In making checks on interior surfaces and lap joints particular attention must be given to areas where drain holes may become clogged, to fittings and braces, compound parts inside the airplane, sections where foreign matter or moisture may accumulate due to improper drainage or disposal outlets, structures underneath floor boards, and faying surfaces. Special attention must be given to areas where magnesium alloys are used.

Areas where dissimilar metals are in contact must be closely examined as an electric current is generated and flows from one metal to the other in the presence of moisture. This current causes a chemical action which results in dissolution of one of the metals, thereby accelerating corrosion. Materials such as sponge, felt, leather, wood, soundproof padding, and neoprene in contact with metals will render such areas damp and will promote corrosion. Before repairs are started, the area must be checked for extent of damage. The extent of corrosion can be determined by test and visual examination. A sharp pointed instrument may be used (with caution) for making this examination.

2. Cleaning/Painting - Corrosion Treatment Practices

NOTE: The following procedures apply to the treatment and prevention of various types of corrosion.

A. Equipment Required.

(1) Paint stripper, Specification MIL-R-8633, (not used for epoxy paints) or equivalent. For epoxy stripper, refer to Section 51-2-0.

WARNING: WHEN USING ACID ETCHANTS OR STRIPPERS WEAR PROTECTIVE CLOTHING (RUBBER GLOVES, GOGGLES, ETC.). IF SKIN IS CONTACTED, WASH IMMEDIATELY WITH WATER. IF EYES ARE AFFECTED, SEEK MEDICAL ATTENTION AT ONCE.

(2) Nonmetallic brush, Specification MIL-B-5612, or equivalent.

(3) Masking tape and paper (to prevent acid etchant from contacting surrounding areas).

(4) Thickened phosphoric acid etchant, Specification MIL-C-25378.

(5) Brush with short, stiff bristles, or aluminum wire brush.

(6) Aluminum wool, Specification MIL-A-4864.

(7) Paint pretreatment chemical film, Specification MIL-C-5541, or equivalent, for areas most susceptible to corrosion.

(8) Wash primer, Specification MIL-C-8514, for use where maximum adhesion is required.

(9) Zinc chromate primer, Specification MIL-P-8585, (yellow or darkened interior green) or epoxy primer, Convair Specification 0-03021H.

NOTE: Epoxy primer, Convair Specification 0-03021H is compatible with zinc chromate primer, Specification MIL-P-8585 and wash primer, Specification MIL-C-8514. It is recommended for use, without the wash primer, in areas exposed to Skydrol or acid.

(10) Eight power magnifying glass.

(11) Sandpaper, 280- and 400-grit.

(12) Chromic acid solution, Specification 0-C-303.

(13) Alkyl sulfonate (wetting agent for application of chromic acid).

(14) Dow No. 1, Specification MIL-M-3171A, Type 1.

(15) No. 00, 0, and No. 1 emery cloth.

(16) Five to ten percent solution, acetic acid.

(17) Wax elulsion, Specification MIL-W-3688, (without silicone oil ingredient).

B. Treat Pitting and Intergranular Corrosion Condition - Clad Aluminum.

(1) Carefully remove finish in an area about 0.25-inch around the borders of the corrosion using paint stripper, Specification MIL-R-8633, and nonmetallic brush or epoxy stripper as applicable.

(2) Allow the stripper to remain on the surface until all the residues are softened.

(3) Wash off with water, using a high pressure hose, if the area can be flushed without trapping stripper. Otherwise, wipe all stripper away with a damp cloth.

(4) Repeat steps (1) through (3) as necessary, until all paint or exhaust deposits are removed. This includes recesses around rivets, etc.

(5) Mask off nearby bare aluminum, plated steel, and magnesium as well as cracks and faying surfaces, to keep acid etchant from contacting these areas.

(6) Apply phosphoric acid etchant, Specification MIL-C-25378, to the corroded area of clad aluminum alloy, using a brush or cloth.

(7) With a short stiff bristle or aluminum wire brush, or aluminum wool, agitate areas of deep pitting until all corrosion products are removed. Pay particular attention to areas around rivet heads and at butt joints of skins.

CAUTION: DO NOT USE STEEL WOOL OR STEEL WIRE BRUSHES. ALUMINUM WOOL MUST NOT BE USED TO ABRADE THE CLAD ALUMINUM. EXCESSIVE AND UNWARRANTED USE OF ALUMINUM WOOL RESULTS IN REMOVAL OF THE PROTECTIVE CLAD AND ADVERSELY AFFECTS THE APPEARANCE ON EXTERNAL SKINS.

(8) Sponge off the acid etchant with a damp cloth rinsed frequently in water. Do not leave etchant in contact with the surface for more than 20 minutes.

(9) Repeat steps (1) through (8) as necessary, concentrating on the pitted areas, until all corrosion is removed. The bottom of each pit should appear bright, and the metal should be uniformly etched. Questionable areas should be examined with a magnifying glass of 8 power or higher.

(10) After all corrosion is removed, thoroughly rinse the treated area with clean water.

(11) For unpainted surfaces, omit the following steps and apply a coat of wax emulsion, Specification MIL-W-3688, 0.2 to 0.3 mil thick (after drying).

(12) For painted surfaces that require maximum adhesion, such as exterior surfaces and when finishing magnesium alloys, apply wash primer, Specification MIL-C-8514, followed by two coats of zinc chromate primer, Specification MIL-P-8585. In areas exposed to Skydrol or acid, apply two coats of epoxy primer, Convair Specification 0-03021H, without wash primer.

(13) Apply final finish, if required. Refer to 51-2-0.

C. Treat Pitting and Intergranular Corrosion Condition - Bare Aluminum.

(1) Remove corrosion products by means of hand scraping with a suitable carbide tipped scraper or rotary file.

(2) After removing all corrosion visible with an 8 power magnifying glass, scrape away an additional amount of material to a further depth of at least 0.002 inch, to ensure that absolutely no corrosion products remain.

(3) The scraped area should be blended out into the surrounding zone in such a way that a saucer-shaped depression is formed to eliminate stress concentration and to ensure that absolutely no corrosion products remain.

(4) After all scraping is completed, polish the area, first with 280-grit, and then with 400-grit abrasive paper.

(5) Aluminum wool may also be used to advantage when removing light corrosion from bare aluminum alloys such as extrusions, tubing, and ducts. Do not use steel wool.

(6) Accomplish steps 2.B.(12) through 2.C.(14).

D. Treat Pitting and Severe Corrosion Condition - Magnesium.

(1) Accomplish steps 2.B.(1) through 2.B.(4).

(2) Prepare chromic acid solution, Specification 0-C-303, 10 percent by weight in distilled water. The solution is most effective when applied hot, although this is not normally practical unless the corroded parts have been removed from the structure. If an agent is needed to effect wetting of the metal by the chromic acid, use 0.05 ounce of alkyl sulfonate per gallon of water.

(3) Mask off nearby operating mechanisms, cracks, and plated steel, to keep the chromic acid from these areas.

(4) Apply the 10 percent chromic acid solution sparingly to the corroded area, using a brush.

(5) Allow the acid to remain on the surface for about 5 minutes, agitating with a nonmetallic brush, as necessary.

(6) Thoroughly rinse off the acid with liberal quantities of clean water.

(7) Repeat steps (1) through (6), as necessary, until all corrosion products have been removed.

(8) Extreme corrosion of magnesium may be removed by accomplishing steps 2.C.(2) through 2.C.(6).

(9) Apply Dow No. 1 treatment, Specification MIL-M-3171A, Type 1, to the affected area with a brush and allow it to remain for one minute, adding more solution if necessary, to keep the surface wet. Blot up excess solution. The protective treatment is very soft at this point. Avoid rubbing or disturbing the surface.

(10) Accomplish step 2.B.(12) or 2.B.(13) and (14).

(11) Apply final finish as required in 51-2-0.

E. Treat Pitting and Severe Corrosion Condition - Steel.

(1) Accomplish steps 2.B.(1) through 2.B.(4).

(2) Removal of pitting or severe corrosion on steel alloys may be accomplished by suitably shaped files, steel wire brushes, or motorized steel wire wheels. Steel wool may also be used to advantage, dependent upon the degree of corrosion attack.

(3) After removing all corrosion visible with an 8 power magnifying glass, scrape away an additional amount of material to a further depth of at least 0.002 inch to ensure that absolutely no corrosion products remain.

(4) The cleaned area should be blended out into the surrounding zone in such a way that a saucer-shaped depression is formed to eliminate stress concentration.

(5) After all mechanical removal is completed, polish the area first with No. 1 emery cloth, and then with No. 0 emery cloth. For finer finishes use No. 00 emery cloth.

(6) Apply final finish as required in 51-2-0.

F. Remove Spilled Battery Fluid.

(1) Rinse the affected areas with generous quantities of clear water, to dilute and remove the fluid, being careful to not spread fluid into surrounding structure.

(2) After the fluid is removed, treat affected area with liberal quantities of a five to ten percent acetic acid solution, applied with a brush or cloth.

(3) Continue to add the acetic acid solution until bubbles cease; then allow the solution to remain on the surface for 5 minutes.

(4) Remove the acetic acid solution by rinsing with clear water, and wiping dry.

(5) Proceed to remove all corrosion products by the method recommended for the specific metals involved; refer to 2.A. through 2.E.

EXTERIOR AND INTERIOR FINISHES - DESCRIPTION AND OPERATION

1. Primer and Paint Coatings

A. General.

The following types of primers and paint coatings are applied to exterior and interior surfaces as shown on Figures 1 and 2.

(1) Zinc chromate primer.

(2) Anti-static black baked top coat.

(3) Epoxy primer.

(4) Moly black epoxy top coat, chafe preventive compound.

(5) Magna No. 4-G-14 polyurethane green primer and Magna No. 8-B-15 polyurethane teflon enamel, chafe preventive compound.

(6) Epoxy top coat (white, gloss gray, clear, and black).

(7) Teflon clear, chafe preventive compound.

(8) White acid resistant lacquer.

(9) Wax, Specification MIL-W-3688.

(10) Unthinned black corrosion preventive compound, Specification MIL-C-16173, Gr. 1.

B. Primer and Paint Coat Areas.

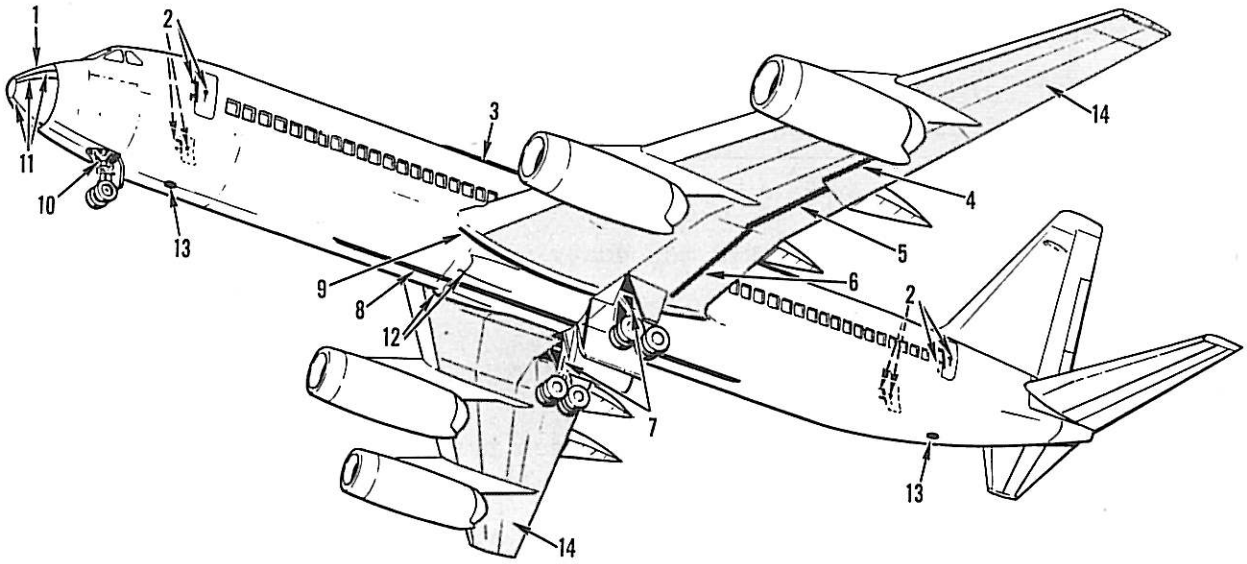
(1) The radome is finished with a coat of anti-static, black baked epoxy top coat; while the lightning arrestors are finished with a coat of black epoxy top coat.

(2) The nose landing gear wheel well is finished with a coat of epoxy primer and a coat of white epoxy top coat.

(3) The nose landing gear is finished with a coat of epoxy primer and a coat of gloss gray epoxy top coat.

(4) The forward and aft passenger and service door handles and hinge fairings are finished with a coat of epoxy primer and coat of gloss gray epoxy top coat.

(5) The primary fuselage structure adjacent to and underneath the forward and aft buffets and lavatories is finished with a coat of epoxy primer.



AIRPLANE ZONES	FINISH APPLIED
1. RADOME	a. BAKED EPOXY TOP COAT (BLACK) ANTI-STATIC
2. PASSENGER AND SERVICE DOOR HANDLES AND HINGE FAIRINGS	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
3. DORSAL ANTENNA	a. BAKED EPOXY TOP COAT (BLACK) ANTI-STATIC
4. OUTBOARD FLAP (FORWARD END)	a. EPOXY PRIMER
5. AILERON (FORWARD END)	a. EPOXY PRIMER
6. INBOARD FLAP (FORWARD END)	a. EPOXY PRIMER
7. MAIN LANDING GEAR	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
8. EXTERNAL LONGERON KEEL	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
9. DRAG ANGLES	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
10. NOSE LANDING GEAR	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
11. LIGHTNING ARRESTORS	a. EPOXY TOP COAT (BLACK) ANTI-STATIC
12. LEADING EDGE CABIN AIR INTAKE DUCT LIP	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
13. CABIN AIR PRESSURE RELIEF EXHAUST DUCT	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)
14. WING LOWER SURFACE	a. EPOXY PRIMER b. EPOXY TOP COAT (GLOSS GRAY)

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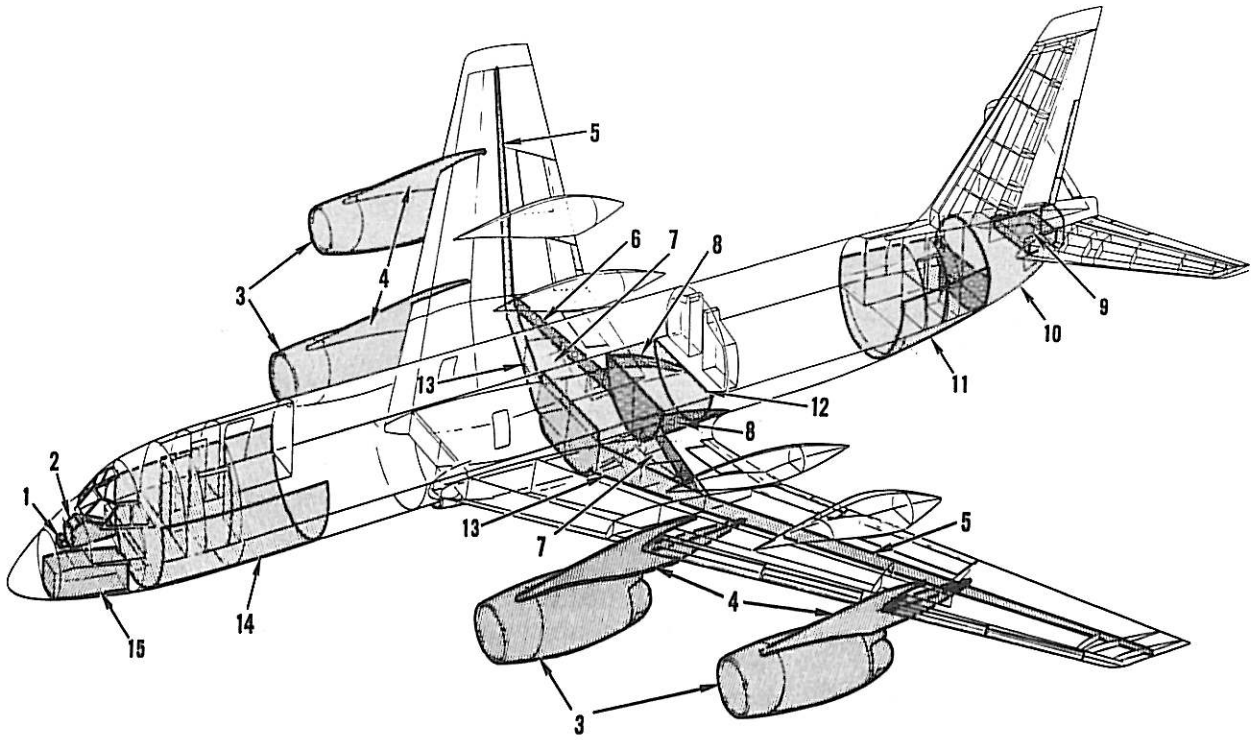

NOTE:
ALL INTERIOR STRUCTURAL ALUMINUM ALLOY SURFACES, EXCEPT FOR INTERIOR SURFACES OF EXTERIOR CLAD SKINS, RECEIVE A CHEMICAL FILM (MIL-C-5541) OR ANODIZE (MIL-A-8625). EXCEPT AS SHOWN, ALL INTERIOR STRUCTURES AND SURFACES OF THE HORIZONTAL AND VERTICAL STABILIZERS AND FUSELAGE RECEIVE ONE COAT OF ZINC CHROMATE PRIMER APPLIED IN ACCORDANCE WITH MIL-P-8585 OR EPOXY PRIMER.
FUSELAGE INTERIOR SURFACES OF EXTERIOR CLAD SKINS RECEIVE ONE COAT OF WASH PRIMER FOLLOWED BY ONE COAT OF ZINC CHROMATE PRIMER OR EPOXY PRIMER.

AIRPLANE ZONES	FINISH APPLIED	
1. BATTERY COMPARTMENT	a. EPOXY PRIMER	b. EPOXY TOP COAT (BLACK)
2. PEDESTAL CASTING	a. EPOXY PRIMER	
3. PODS, INCLUDING ALL SURFACES OF HINGED FAN DUCTS, SPLITTERS, AND FAN STUB DUCTS.	a. EPOXY PRIMER	
4. PYLONS	a. EPOXY PRIMER	
5. REAR SPAR (AFT SIDE OUTBOARD OF WHEEL WELL)	a. EPOXY PRIMER	
6. MAIN LANDING GEAR BEAM (AFT SIDE)	a. EPOXY PRIMER	
7. MAIN LANDING GEAR WHEEL WELL	a. EPOXY PRIMER	b. EPOXY TOP COAT (WHITE)
8. WING-TO-FUSELAGE FAIRING	a. EPOXY PRIMER	
9. INBOARD END HORIZONTAL STABILIZER	a. EPOXY PRIMER	
10. AFT FUSELAGE COMPARTMENT	a. EPOXY PRIMER	
11. AFT BUFFET AREA (AIRFRAME STRUCTURE)	a. EPOXY PRIMER	
12. HYDRAULIC COMPARTMENT	a. EPOXY PRIMER	
13. REAR SPAR (AFT SIDE WHEEL WELL AREA)	a. EPOXY PRIMER	b. EPOXY TOP COAT (WHITE)
14. FORWARD BUFFET AREA (AIRFRAME STRUCTURE)	a. EPOXY PRIMER	
15. NOSE LANDING GEAR WHEEL WELL	a. EPOXY PRIMER	b. EPOXY TOP COAT (WHITE)

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(6) The forward and aft cabin air pressure relief exhaust ducts are finished with a coat of epoxy primer and a coat of gloss gray epoxy top coat.

(7) The external longeron keel is finished with a coat of epoxy primer and a coat of gloss gray epoxy top coat.

(8) The leading edge of the cabin air intake duct lip is finished with a coat of epoxy primer and a coat of gloss gray epoxy top coat.

(9) The drag angles are finished with a coat of epoxy primer and a coat of gloss gray epoxy top coat.

(10) The dorsal antenna is finished with a coat of anti-static black baked epoxy top coat.

(11) The interior surfaces of the pylons and nacelles are finished with a coat of epoxy primer.

(12) The main landing gear wheel well is finished with a coat of epoxy primer and two coats of white epoxy top coat.

(13) The main landing gear is finished with a coat of epoxy primer and a coat of gloss gray epoxy top coat.

(14) The forward ends of the ailerons, inboard and outboard flaps are finished with a coat of epoxy primer.

(15) The battery compartment structure is finished with a coat of epoxy primer and two coats of black epoxy top coat.

(16) The hydraulic compartment is finished with a coat of epoxy primer.

(17) The inboard end of the horizontal stabilizer within the aft fuselage compartment is finished with a coat of epoxy primer.

(18) The inside of exterior clad fuselage skins is finished with zinc chromate or epoxy primer.

(19) The aft fuselage compartment is finished with a coat of epoxy primer.

(20) All main entrance and service door sliding tracks and cable drum grooves are finished with a coat of epoxy primer and a coat of moly black epoxy top coat. (A coat of Magna No. 4-G-14 polyurethane green primer and a top coat of Magna No. 8-B-15 polyurethane teflon enamel may be used as an alternate.) The main landing gear door outboard edge and main landing gear fairing frame are finished with a coat of epoxy primer and a coat of teflon clear.

(21) The lower surface of each wing, extending from front spar to trailing edge, is finished with a coat of epoxy primer, a coat of gloss gray epoxy top coat, and wax, Specification MIL-W-3688.

(22) All exposed surfaces of attaching parts such as nuts, washers, rivets, high shear rivets, screws, self tapping screws, sleeves for shake-proof fastener studs, self-locking nuts, speed nuts wire shafts, etc., when in contact with wood or magnesium must be overcoated with unthinned black compound, Specification MIL-C-16173, Gr.1, in such a manner as to seal all exposed entrances to dissimilar metals contact areas and to extend 0.25 inch onto the wood or magnesium surface around the boundary of the attaching part.

(23) The battery compartment is finished with a coat of epoxy primer and two coats of black epoxy top coat.

1. Cleaning/Painting - Removal of General Primers and Paints

A. General Precautions.

When removing paint or applying solvents and etchants certain precautions must be observed to prevent personal injury. The following shall be noted:

(1) Do not breathe vapors from solvents over long periods of time. Assure adequate ventilation of vapors and fumes, or wear respirator.

(2) Wear face protection and protective rubber clothing such as gloves, hats, rain coats, and other safety clothing when preparing overhead surfaces.

(3) Take necessary measures to prevent contact of solvents, cleaners or strippers with skin.

(4) Wash skin contacted by solvent, paint stripper, or etchant AT ONCE with water. If eyes are affected report to a first aid station for medical attention.

B. Equipment Required.

(1) Waxed paper, moisture barrier, Zellerbach No. 767 SWA-7885 (30-40), Zellerbach, Division of Shufford Mills, Hickory, N.C. (for protection of windows).

(2) Paint stripper, Specification MIL-R-8633, or equivalent.

(3) Soft brush (for smoothing stripper).

(4) Steam cleaning, air-water blasting, or high pressure water rinsing equipment (for removing stripper and loosened paint).

(5) Aliphatic naphtha, Federal Specification TT-N-95a, or equivalent.

(6) Clean, lint-free cloth (several feet).

(7) Plastic scraper or squeegee.

(8) Sponge.

(9) Cee Bee A202, Cee Bee Chemical Company Inc., Los Angeles, California or equivalent.

CAUTION: DO NOT USE ON STEEL PARTS OF THE LANDING GEAR, STEEL BOLT SHANKS LARGER THAN 0.25-INCH DIAMETER, AND HORIZONTAL STABILIZER PIVOT BEARING SPINDLES. REFER TO PARAGRAPH 2.A. FOR MATERIALS THAT MAY BE USED ON THESE PARTS.

(10) Sodium bicarbonate (for rinse after application of Cee Bee A202).

C. Remove Paint and/or Primer.

NOTE: When paint is chipped, cracked or peeled it is necessary to refinish the material to prevent corrosion, as follows.

CAUTION: PASSENGER AND FLIGHT COMPARTMENT WINDOWS MUST BE PROPERLY COVERED AND PROTECTED WHEN PAINTS, STRIPPERS, ETC., ARE BEING APPLIED TO STRUCTURE NEAR WINDOWS, DUE TO CRAZING EFFECT OF SOLVENT FUMES. APPLY WAXED PAPER FOR THE PROTECTION OF THE WINDOWS.

(1) Apply a heavy coat of paint stripper conforming to Specification MIL-R-8633 to the painted surface. Apply more stripper when necessary to prevent drying out.

CAUTION: KEEP STRIPPER OFF ACRYLICS, RUBBER, PLASTICS, DECALS, AERODYNAMIC SMOOTHER AND SEALANT, AND PAINTED SURFACES WHICH ARE NOT TO BE STRIPPED. AVOID APPLYING STRIPPER IN FAYING SURFACES OR OTHER AREAS WHERE RINSING IS DIFFICULT.

(2) Smooth stripper with a soft brush, if necessary, to assure complete air-free coverage.

(3) Allow stripper to set undisturbed from one to four hours, or until paint is completely loosened. Paint is sufficiently loose when light rubbing with a cloth produces a bare metal surface.

(4) Agitate the stripper and loosened paint with a hard fiber scrub brush.

(5) Spray on an additional light coating of stripper and allow it to set an additional 30 to 60 minutes.

(6) Remove stripper and loosened paint by steam cleaning, air-water blasting, or high pressure water rinsing.

NOTE: For areas of the airplane finish where rinsing is not feasible, remove stripper, and paint, with dry rags and plastic scrapers or squeegees, followed by sponge washing with clean aliphatic naphtha.

(7) If paint is not completely removed repeat steps 1.C.(1) through 1.C (6).

2. Cleaning/Painting - Removal of Special Primers and Paints

NOTE: Special finishes such as epoxy primer and enamel or other special epoxy finishes may be removed as follows:

A. Equipment Required.

(1) Cee Bee A202, Cee Bee Chemical Co. Inc., Los Angeles, California or equivalent.

CAUTION: DO NOT USE ON STEEL PARTS OF THE LANDING GEAR, STEEL BOLTS LARGER THAN 0.25-INCH DIAMETER, OR THE HORIZONTAL STABILIZER PIVOT BEARING SPINDLES.

(2) Delchem EZ Strip 19A, Pennsalt Chemical Co., Los Angeles, Calif.

CAUTION: ONLY DELCHEM EZ STRIP 19A SHALL BE USED ON STEEL PARTS OF THE LANDING GEAR, STEEL BOLTS LARGER THAN 0.25-INCH DIAMETER, AND THE HORIZONTAL STABILIZER PIVOT BEARING SPINDLES.

(3) Several feet of cheesecloth, or several clean lint-free rags.

B. Remove Special Primers and Paints.

(1) Apply Cee Bee A202, or Delchem EZ Strip 19A to the special finish in accordance with the manufacturer's instructions.

(2) Remove finish by rubbing the painted surface with a clean rag or cheesecloth.

(3) These are very "hot" strippers and must be used with care.

CAUTION: IF CEE BEE A202 IS APPLIED TO MAGNESIUM IT WILL REMOVE 0.0003 INCH PER HOUR. FOLLOW APPLICATION OF STRIPPER ON MAGNESIUM WITH AN ALKALINE RINSE OR DIP.

3. Cleaning/Painting Surface Cleaning Before Applying Epoxy Coatings

This pre-paint surface preparation shall be used on all aluminum alloy surfaces which are to be finished with epoxy coatings as follows: when the surface to be finished has not received anodic or chemical film treatment (fuselage clad skins, clad control surfaces, honeycomb panel clad skins, etc), or when the surface to be finished, treated or non-treated, has had prior paint coatings.

A. Equipment Required.

(1) Remover "H", Tec Chemical Co., 524 S. Monterey Pass Rd., Monterey Park, California.

(2) Wash primer, Specification MIL-C-8514, for use where maximum adhesion is required.

(3) #376 Conditioner, Tec Chemical Co., 524 S. Monterey Pass Rd., Monterey Park, California.

(4) Several feet of cheesecloth or several lint-free rags.

(5) Brush, swab, or spray equipment for application of remover and conditioner.

B. Preparation.

(1) Apply protective covering to all non-metallic surfaces as directed in paragraph 1.

(2) Clean area as directed in 51-0.

C. Prepare Surface.

(1) Apply remover "H" with clean lint-free cloth saturated with remover "H" to area being prepared for finishing.

(2) Wipe area dry with a clean lint-free cloth.

(3) Using a brush or swab, apply wet coating of #376 conditioner. Allow #376 conditioner to remain on the surface at least two minutes, but not more than one hour.

(4) Remove #376 conditioner coating by wiping with a clean lint-free cloth, saturated with clean tap water.

(5) Wipe area dry with a clean lint-free cloth. Cleaned conditioned surfaces shall be permitted to dry until all water trapped in gaps, crevices, etc., has evaporated.

NOTE: To expedite drying, excess moisture may be blown from recesses, with dry filtered air. Do not use air from direct lines as most air lines contain oils which will be harmful to the cleaned areas. In areas not exposed to Skydrol or acid, use wash primer to obtain maximum adhesion of the epoxy finish.

(6) Apply epoxy finish within 8 hours of surface conditioning.

4. Approved Repairs - Application of Primers and Paints for Repair (see Figures 1 and 2)

NOTE: All of the airplane finishes are applied using standard spray guns and equipment. These finishes are mixed at time of use according to the manufacturer's instructions, furnished with each kit. The following procedure applies to preparing surfaces for the application of repair finishes, and the application of the finishes.

A. Equipment Required.

(1) Spray equipment.

(2) Stripping equipment and materials; refer to 2.B.

(3) Applicable paints, as indicated on Figures 1 and 2.

(4) Wax emulsion, Specification MIL-W-3688, (without silicone oil ingredient).

B. Repair Finish.

(1) Remove scratched, loose or blistered sections of finish with stripper; refer to items 1.A. through C., and to 2.A. and B. for procedures.

(2) Mask off areas that are not to be painted, using masking tape and paper.

(3) Apply only enough paint to build the repair area up to the adjacent paint thickness; see Figures 1 and 2. Cure coating in accordance with manufacturer's instructions.

NOTE: Epoxy coatings may be cured by applying heat for 4 hours at 54.6 degrees C (130 degrees F) to 65.4 degrees C (150 degrees F).

(4) On wing lower surfaces only, apply a 0.2 to 0.3 mil thickness (after drying) of wax emulsion, Specification MIL-W-3688.

5. Approved Repairs - Antistatic Protective Coating Repairs for Radome and Antennas

A. Equipment Required.

(1) No. 240 sandpaper.

(2) No. 400 sandpaper.

(3) Aliphatic naphtha, Federal Specification TT-N-95a.

(4) Cat-A-Lac No. 453-1-1, Finch Paint & Chemical Co., Torrance, Calif., antistatic black coating.

(5) Resistance-measuring instrument consisting of two 0.016-inch radius hemispherical contacts spaced 1.25 inch apart; instrument is to be mounted on a suitable handle made of Teflon or similar non-hygroscopic material.

(6) Several feet of clean cheesecloth.

B. Repair Finish.

(1) Remove scratched, blistered, or loose sections of antistatic coating by wet sanding with No. 240 sandpaper and then with No. 400 sandpaper. Sand until damaged material is removed and remaining material is faired smoothly into surrounding area approximately one inch beyond the damaged area. Avoid sanding into the underlying plastic surface.

(2) Clean sanded area with a clean cheesecloth moistened with aliphatic naphtha.

CAUTION: SURFACE MUST BE CLEAN, DRY AND FREE OF DUST, DIRT, GREASE OR ANY OTHER FOREIGN MATTER.

(3) Apply Cat-A-Lac antistatic black coating, 0.0010 to 0.0015 inch thick on the sufface of the damaged area.

NOTE: Fair in edges of coating, without ridges or excessive build-up between the old and the new application.

(4) Cure coating in accordance with manufacturer's instructions. The cured film shall be free of bubbles, pinholes, cracks, and other irregularities.

(5) After the coating has cured, measure the electrical resistance by pressing instrument against the coating with a force of between one and two pounds. Reading shall indicate between 20 and 200 megohms per square.

CAUTION: DO NOT USE FORCE SUFFICIENT TO DAMAGE COATING WITH PROBES OF INSTRUMENT.

(6) Measure resistance at minimum of six places within the area, and no closer than within one inch of nearest edge or of embedded metallic surface.

6. Approved Repairs - Precautions for Stripping of Epoxy Paint

A. General Precautions.

When removing epoxy paint, precautions must be taken to prevent stripper from entering and damaging certain parts of the airplane. The following shall be noted:

(1) When stripping paint from horizontal stabilizer top surfaces, immediately remove excess stripper, and avoid spilling or flowing of stripper into control surfaces nose portion.

(2) Do not chemically strip epoxy paint from plastic surfaces. If paint stripping is desired, use No. 280 "wet or dry" sanding paper. If recoating is desired, the new coating should be applied over the old coat.

(3) Keep contact time of stripper to a minimum on magnesium alloy parts such as passenger and service door handles, hinge fairings, and on cabin air left and right intake ducts leading edges on fuselage bottom. In order to prevent corrosion, rinse with water immediately after removing primer.

B. Equipment Required.

(1) Waxed paper, moisture barrier, Zellerbach No. 767 SWA-7885 (30-40), Zellerbach, Division of Shufford Mills, Hickory, N. C.

(2) Pressure sensitive masking (paper) tape, moisture resistant, 1/2", 1", and 1-1/2" wide, 3M Co., St. Paul 6, Minn.

C. Mask Surfaces.

(1) Radome, with double layer of moisture proof paper.

(2) Cockpit windows, with single layer moisture proof paper.

(3) Tape all exposed surfaces of sealing compounds and rubber gaskets.

(4) Tape all gaps around entrance doors, handles, and hinges.

(5) Mask all static ports on fuselage and wing.

(6) Mask passenger windows as follows: Tape the exterior window boundary and rubber seal, then mask with double layer paper over each window extending 0.8 inch wide on metal flange around window.

(7) Mask all antennas with double layer of paper.

(8) Mask complete nose and main landing gear assemblies, including tires and floor areas around tires with single layer paper.

(9) Close all doors on fuselage bottom, between wings, on wing bottom, ar rear spar, and tape door gaps.

(10) Close all doors on pods and pylons and tape door gaps.

(11) Close doors on vertical stabilizer and tape door gaps.

(12) Tape all lights.

(13) Tape the silicone rubber seals of horizontal stabilizer blades at fuselage left and right side.

7. Approved Repairs - Rain Erosion Resisting Coating on Plastic Exterior Surfaces

A. Equipment Required.

(1) No. 280 sandpaper.

(2) Aliphatic naphtha, Federal Specification TT-N-95a.

(3) Toluene, Federal Specification TT-T-548.

(4) Several feet of clean cheesecloth.

(5) PR 1432 rain erosion coating, Products Research Co., Burbank, Calif.

B. Repair Coating.

(1) Remove loose, blistered, or erosion damaged sections of coating by sanding with sandpaper (280 grit). Sand until damaged material is removed and remaining material is faired smooth into surrounding area about one-half inch beyond damage area. Avoid sanding into underlying plastic surface.

(2) Clean sanded area with a clean cheesecloth moistened with aliphatic naphtha.

CAUTION: SURFACE MUST BE CLEAN, DRY AND FREE OF DUST, DIRT, GREASE OR ANY OTHER FOREIGN MATTER.

(3) Mask off areas that are not to be coated, using masking tape and paper.

(4) Apply cross spray coat of PR 1432, rain erosion coating 0.0015 to 0.002 inch thick to clean prepared surface. Allow 5 minutes set time between each coat and apply a total of 6 cross spray coats. Total thickness of coatings not to exceed 0.010 ±0.001 inch (after drying).

(5) Remove masking tape and fair edges of the applied coating by sanding lightly with 280 grit sandpaper.

(6) Cure coating for a minimum of 24 hours at room temperature or cure at 130°F to 150°F for a minimum of 4 hours.

C. Replace Coating.

(1) Mask off areas that are not to be removed, using masking tape and paper.

(2) Remove coating by rubbing with a stiff-bristled (nonmetallic) brush moistened with toluene. As the coating is loosened with brush, wipe it off with cheesecloth moistened with toluene. Continue until all coating is removed.

(3) Clean area with a clean cheesecloth moistened with aliphatic naphtha.

(4) Replace coating using procedure outlined in steps B.(4) through B.(6).

8. Removal/Installation Lightning Arrestor Tape on Radome

A. Equipment Required.

(1) Several feet cheesecloth (as required).

(2) Methyl-Ethyl-Keytone (MEK) Federal Specification TT-M-261, or equivalent.

(3) Naphtha, aliphatic, Federal Specification TT-N-95a, or equivalent.

(4) Tape, BT 1218 (pressure sensitive) black matte aluminum, 3/8 inch wide, Buel-Town Co., 275 - 5th Ave., San Diego, California or equivalent.

B. Preparation - None.

C. Remove Tape.

(1) Remove damaged tape as required.

NOTE: For proper installation, observe original configuration and bonding contact points with fuselage.

(2) Remove adhesive residue with cheesecloth moistened with MEK.

CAUTION: DO NOT USE SANDPAPER TO REMOVE ADHESIVE RESIDUE.

D. Replace Tape.

(1) Clean the area with cheesecloth moistened with aliphatic naphtha.

(2) Apply new lightning arrestor tape.

CAUTION: DO NOT TOUCH ADHESIVE. REMOVE PAPER FROM ADHESIVE ONLY AS THE TAPE IS USED.

(3) Using hand pressure, press tape so that it makes a firm contact with radome.

SEALANTS AND FAIRING COMPOUNDS - DESCRIPTION AND OPERATION

1. Types of Sealants and Fairing Compounds

A. General Sealants (Fuselage, Vertical and Horizontal Stabilizers, Wings Fuel-Tight Areas).

The following general sealants are used for sealing repairs in the pressure cabin structure, wing fuel-tight areas, lavatory and buffet areas, and in the weathertight faying surfaces of the vertical and horizontal stabilizers, fuselage and wing skins:

(1) EC 1291 and EC 1293.

EC 1291 and EC 1293 are sealing compounds, each consisting of an accelerator and a base material. These compounds are mixed at time of use according to the manufacturer's instructions furnished with each kit. Mixed EC 1291 is of high flow and has a medium tan color, while mixed EC 1293 is of medium flow and has a light tan color. These mixtures are suitable for use in areas where operating temperatures do not exceed 135 degrees C (275 degrees F).

NOTE: Quick Curing EC 1291 and EC 1293 sealers that cure within 4 to 6 hours are recommended in preference to the slower curing sealants. The work life of these Quick Curing sealers is from 30 minutes to one hour at 24 degrees C (75 degrees F) curing temperature. For small jobs Quick Curing EC 1291 and EC 1293 repair sealers that cure within one hour at 24 degrees C (75 degrees F) may be used. The work life of these sealers is five minutes.

B. Special Sealants (Pods, Pylons, Fuselage Compartments).

The following special sealants are applied to the faying surfaces of pods and pylons, all doors and cover plates without sealing rings, and the fuselage hydraulic compartment, for weathertightness and compartment sealing as listed:

(1) EC 1663.

EC 1663 consists of an accelerator and a base material. These are mixed at time of use according to the manufacturer's instructions furnished with each kit. The mixture is of high flow, suitable for brush coating or faying surface sealing in temperature ranges up to 315 degrees C (600 degrees F) in areas exposed to Skydrol 500A hydraulic fluid, and to spillage of oils in the fuselage, pod and pylon, and vertical and horizontal stabilizers. Apply EC 1662 primer for maximum adhesion prior to application of EC 1663.

(2) EC 1667.

EC 1667 consists of an accelerator and a base material. These are mixed at time of use according to the manufacturer's instructions furnished with each kit. The mixture is of low flow, suitable for faying surface and fillet type sealing for temperatures up to 315 degrees C (600 degrees F) and in areas exposed to Skydrol 500A hydraulic fluids, and spillage of fuels and oils in the fuselage, pod and pylon, and vertical and horizontal stabilizers. Apply EC 1662 primer prior to application of EC 1667, for maximum adhesion.

(3) PR 1436.

PR 1436 consists of an accelerator and a base material. These are mixed at time of use according to manufacturer's instructions furnished with each kit. The mixture is of light gray synthetic rubber. This material is suitable for use in temperature ranges from -54 degrees C (-65 degrees F) to 135 degrees C (275 degrees F). It is used for sealing of external butt joints in unpainted Skydrol areas and as an exterior smoothing compound for skin lap and butt joints sealing in the areas of the forward and aft lavatory service doors, as shown on Figure 202.

NOTE: PR 1436 is compatible with EC 1328, EC 1651, EC 1653, and QC 2-0078 and is a recommended replacement. It eliminates multiple stocking of fairing components.

SEALANTS AND FAIRING COMPOUNDS - MAINTENANCE PRACTICES

1. Removal/Installation Sealants and Fairing Compounds

A. Equipment Required.

(1) Several feet of cheesecloth (as required).

(2) Aliphatic naphtha, Federal Specification TT-N-96a, or equivalent.

(3) Sealant(s) for fuselage fillets - EC 1291, EC 1293 compound, 3M Co., St. Paul 6, Minn.

(4) Sealant(s) for fuselage holes and voids - EC 1291, EC 1293 compound. 3M Co., St. Paul 6, Minn.

(5) Sealant(s) for fuselage, wing, empennage, nacelle and pylon metal-to-nonmetal sealing - refer to item 1.A.

(6) Sealant(s) for pylons - EC 1663 compound, 3M Co., St. Paul 6, Minn.

(7) Sealant(s) for fuselage, nacelle, and pylon gap and relief holes - EC 1662 primer; EC 1663, EC 1667 compound.

(8) Sealant(s) for fuselage, wing,empennage, nacelles, and pylon doors - EC 1662 primer; EC 1663, EC 1667 compound.

(9) Sealant(s) for exterior smoothing and sealing skin joints - PR 1436 fairing compound, Products Research Co. Inc., Los Angeles, Calif.

(10) Plastic spatula, or squeegee.

(11) Handgun, Semco Sales and Service, 20 West Florence Ave., Inglewood, Calif.

(12) Coarse garnet paper.

(13) Trimming tool, locally manufactured.

(14) Petrolatum, Specification VV-P-236, or equivalent.

B. Preparation - None.

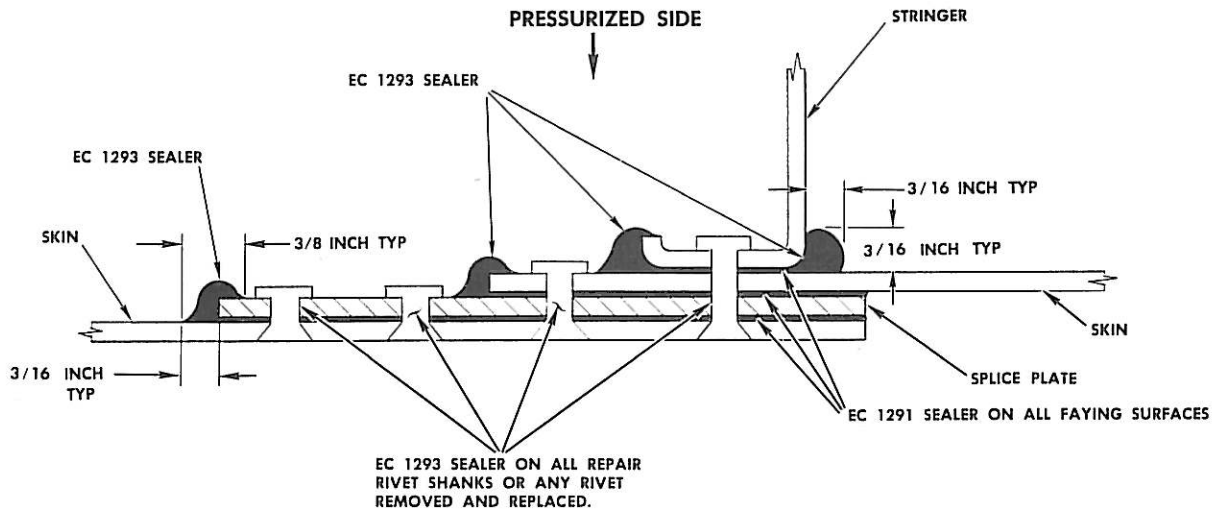
C. Remove Sealants.

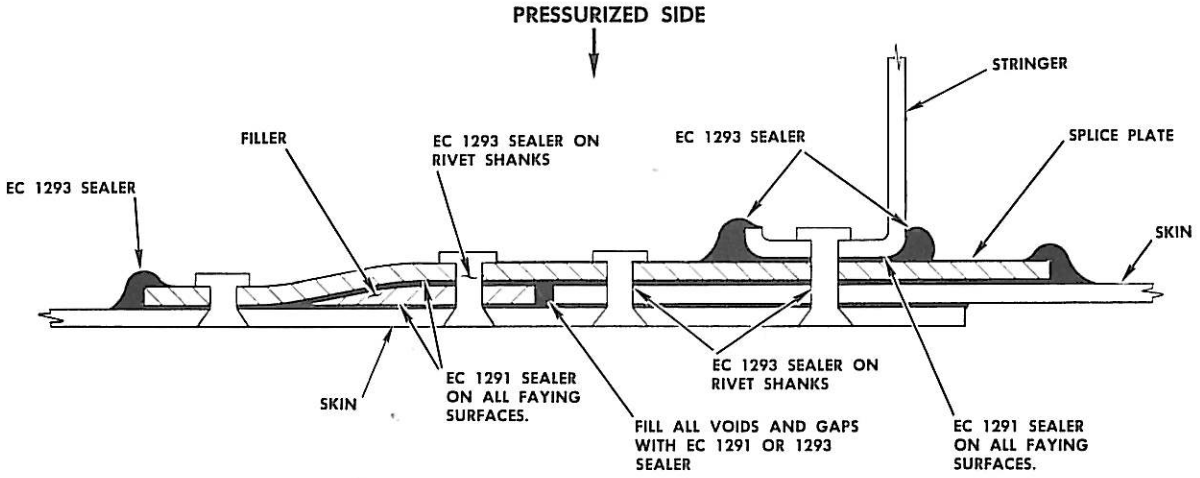
(1) Remove sealants as required, using a plastic spatula and aliphatic naphtha.

(2) Dissolve and remove residual sealant with cheesecloth dampened with aliphatic naphtha.

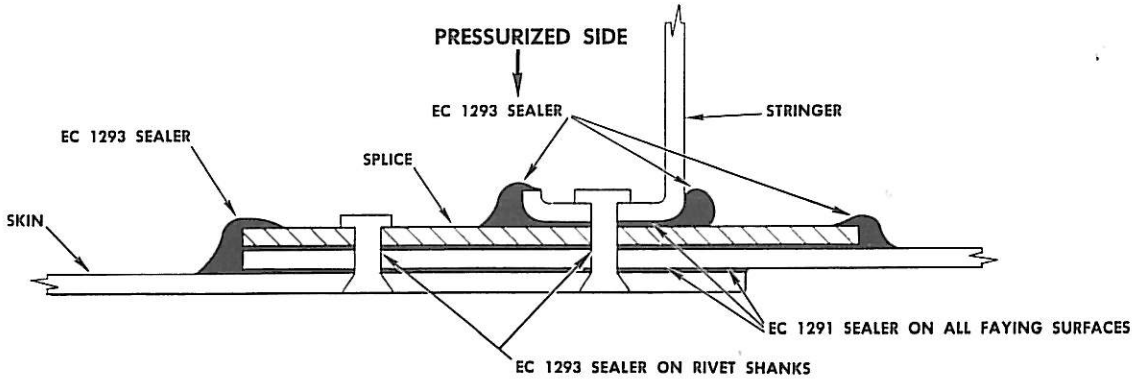
D. Apply Fuselage Fillet Sealant. (See figures 201 and 202.)

(1) Remove all chips, dirt, or other foreign material from area to be sealed.





NOTES:
1. THIS METHOD OF PRESSURE SEALING IS APPLICABLE TO ALL REPAIRS IN PRESSURIZED AREAS OF FUSELAGE.
2. EC 1293 SEALER MAY BE APPLIED TO FAYING SURFACE IF EC 1291 SEALER IS NOT AVAILABLE.



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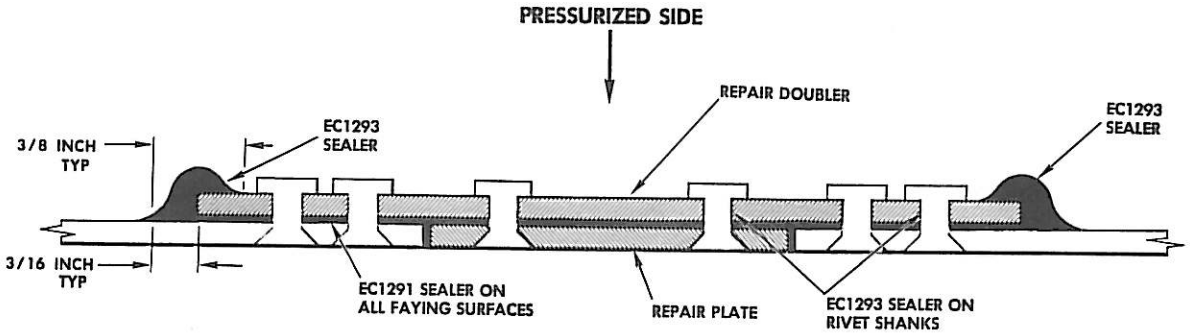
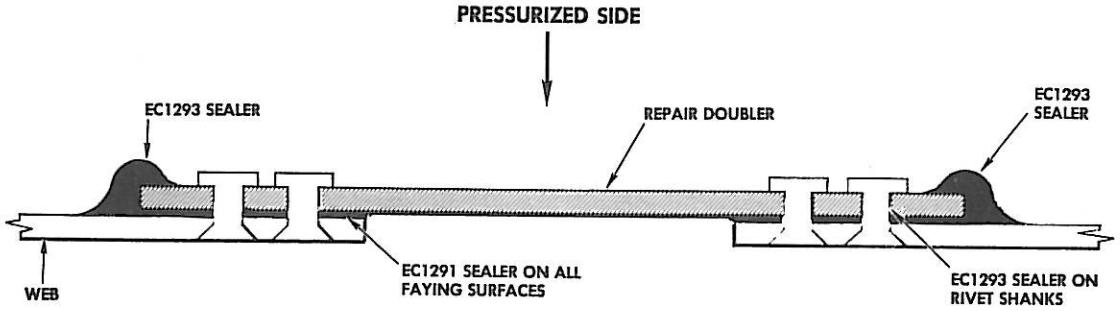
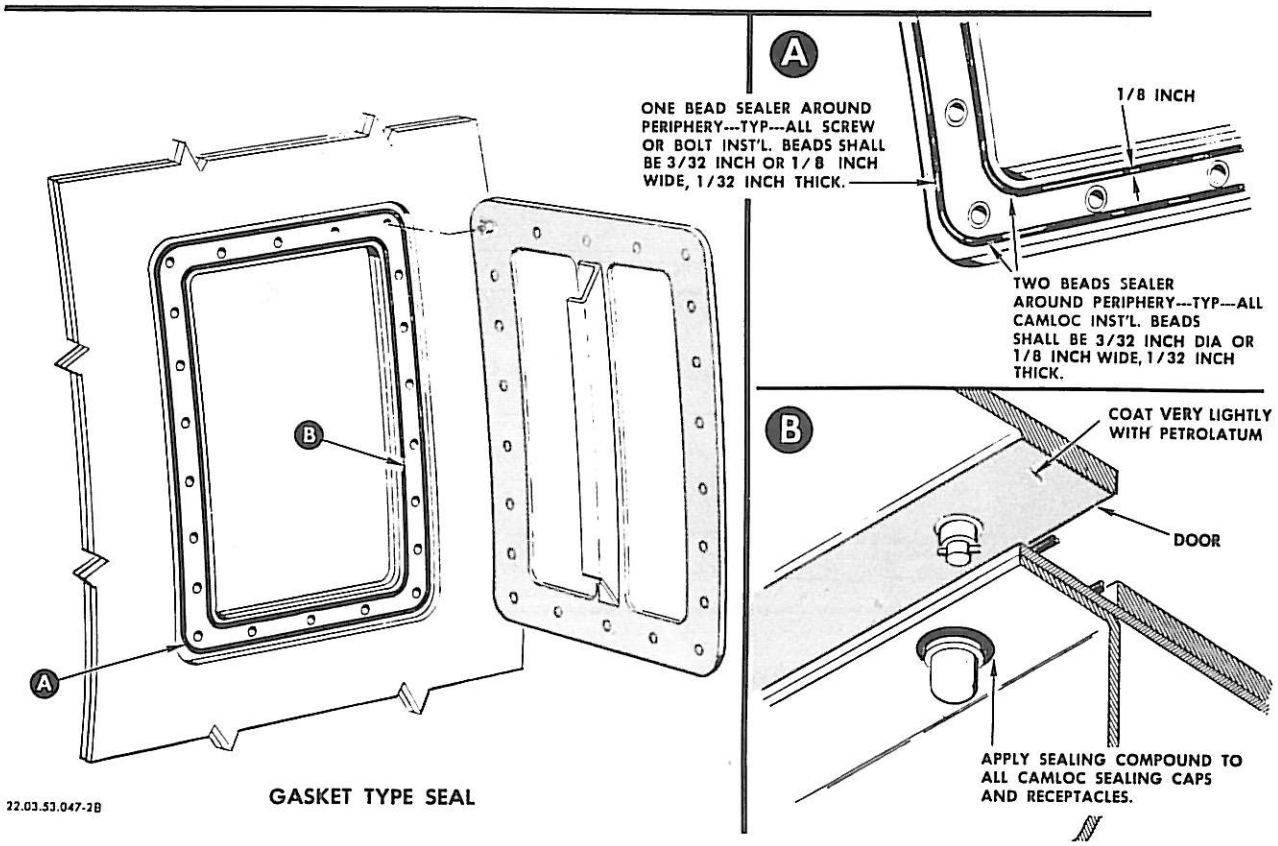


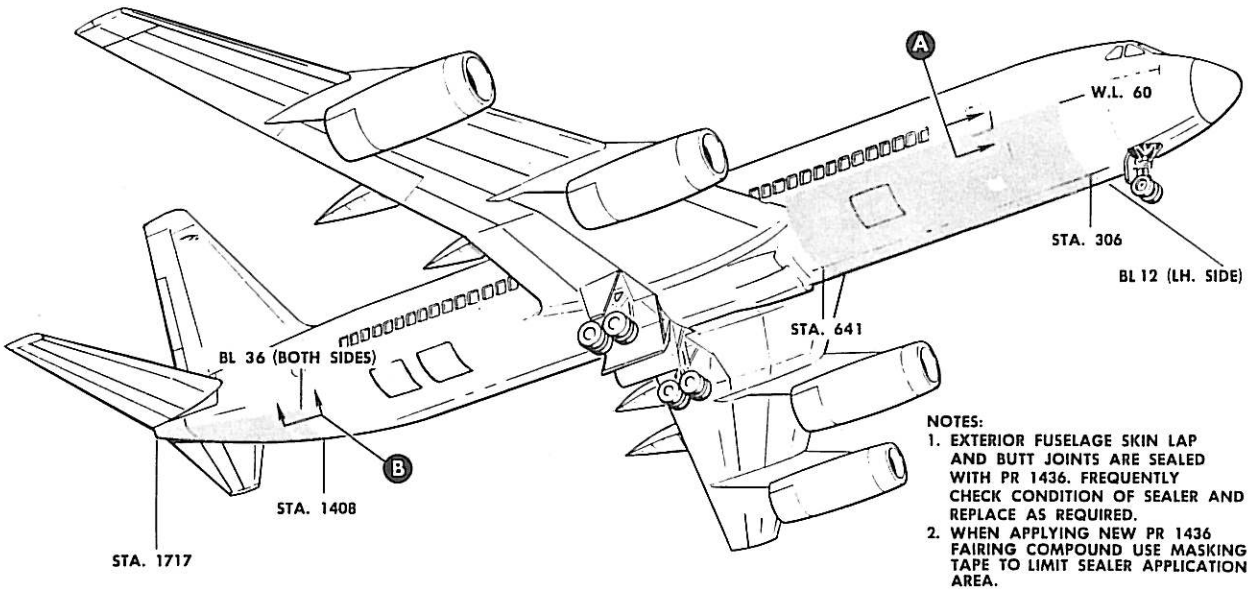
PRESSURE SEALANTS APPLIED TO FLUSH SKIN OR WEB



PRESSURE SEALANTS APPLIED TO TYPICAL WEB OR SKIN REPAIR

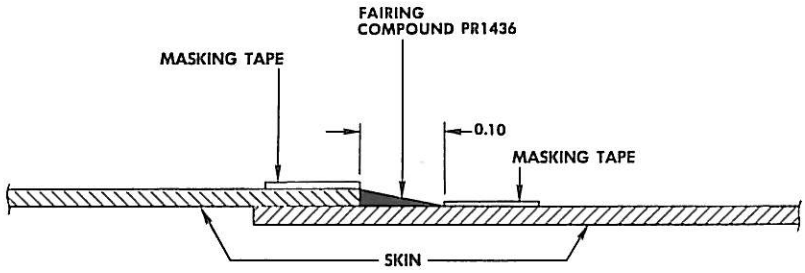


GASKET TYPE SEAL



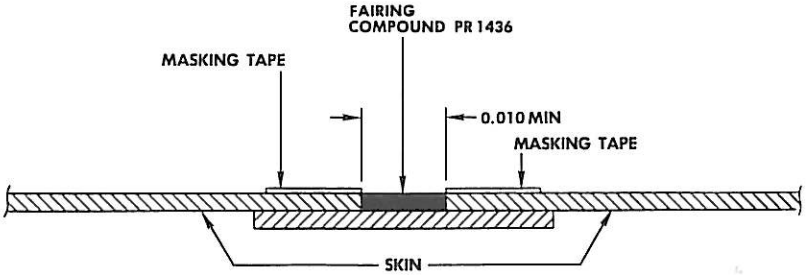
NOTES:
1. EXTERIOR FUSELAGE SKIN LAP AND BUTT JOINTS ARE SEALED WITH PR 1436. FREQUENTLY CHECK CONDITION OF SEALER AND REPLACE AS REQUIRED.
2. WHEN APPLYING NEW PR 1436 FAIRING COMPOUND USE MASKING TAPE TO LIMIT SEALER APPLICATION AREA.

A



LAP JOINT BEAD SEAL (FORWARD AND AFT LAVATORY AREA SKIN SPLICE)

B



BUTT JOINT BEAD SEAL (FORWARD AND AFT LAVATORY AREA SKIN SPLICE)

30.02.51.015

(2) Clean the area with cheesecloth dampened with aliphatic naphtha.

(3) Apply EC 1293 compound. See Figure 201 for typical application of sealant.

(4) Apply the sealant fillet so that it is continuous within itself, and also where it joins adjacent seals.

(5) In areas where it is difficult or inefficient to apply fillet seals, such as in skin attachments to door and door opening frames, passenger window frames, or to pilots' enclosure posts, apply EC 1291 compound to a thickness of approximately 0.016 inch between the faying surfaces, to form a flash bead of about 0.06 inch width and height.

(6) Do not remove the excess compound forced from between the sealed surfaces in the form of a flash bead except when it is in excess of 0.125 inch diameter, or removal is required for aerodynamic smoothness or because of physical interference. Remove excess with clean cheesecloth dampened with aliphatic naphtha before cure.

E. Apply Fuselage Hole and Void Sealant.

(1) Remove all chips, dirt, or other foreign material from area to be sealed, using cheesecloth dampened with aliphatic naphtha.

(2) Seal corner relief holes, voids, and other openings less than 0.188 inch in diameter with EC 1293 compound.

(3) Seal corner relief holes, voids, and other openings between 0.188 inch and 0.438 inch in diameter, or elongated holes, with suitably shaped plugs of cured sealing compound (EC 1293).

(4) Prior to insertion, clean plugs with aliphatic naphtha and coat with EC 1291 compound.

(5) Using hand pressure, insert plugs so that they are wedged firmly into openings.

(6) After insertion, trim plugs and coat with EC 1293.

(7) Do not remove excess compound forced from between sealed surfaces in the form of a flash bead except when it is in excess of 0.125 inch in diameter, or is detrimental to maintenance of aerodynamic smoothness (refer to 51-7-0) or because of physical interference. Remove excess, if required, with clean cheesecloth dampened with aliphatic naphtha.

F. Apply Metal-to-Nonmetal Sealant to Fuselage, Wing, Empennage, Pod and Pylon.

NOTE: This procedure applies where sealing compounds are necessary to cement metal-to-metal, metal-to-neoprene rubber, to phenolic, and to polyester and epoxy laminates.

(1) Roughen faying surface of the nonmetal materials with coarse garnet paper.

(2) Remove loosened particles, dirt, moisture, grease, soot, and other foreign matter, from the surfaces to be cemented, using a clean cheesecloth dampened with aliphatic naphtha.

(3) Apply single coat of the prescribed compound (refer to item 1.A.) of approximately 0.016 inch thickness on one of the faying surfaces.

(4) Place surfaces together and apply approximately one pound pressure, as evenly distributed as practical, until cured; refer to manufacturer's instructions.

G. Apply Pylon Sealant.

(1) Clean faying surfaces of compartments requiring fluid and vapor tightness, which are to be sealed, using cheesecloth dampened with aliphatic naphtha.

(2) Coat surfaces to a thickness as thin as possible with EC 1662 primer, and allow to dry for at least 30 minutes.

(3) Apply EC 1663 compound to one of the two faying surfaces to a thickness of approximately 0.016 inch, to form a flash bead of about 0.060 inch diameter. See Figure 201 for typical faying surface seal.

NOTE: In areas where it is not practicable to apply faying surface seals, it is permissible to apply fillet seals, as shown on Figure 201.

H. Apply Fuselage, Nacelle, and Pylon Gap and Relief Hole Sealants.

(1) Clean area to be sealed, using clean cheesecloth dampened with aliphatic naphtha. Make sure area is free of chips, oil and grease, dirt, or any other foreign matter.

(2) To gaps and relief holes not exceeding 0.12 inch width, apply coat of EC 1662 primer. Allow primer to dry at least 30 minutes.

(3) Apply EC 1667 compound. See Figure 201 for typical application of sealant.

(4) For gaps and relief holes larger than 0.12 inch width, but not exceeding 0.38 inch width, make a suitably shaped plug, using cured EC 1667 or EC 1663 compound.

(5) Clean plug with aliphatic naphtha, and coat with one of noted compounds; using hand pressure, insert plug in opening; see Figure 201.

(6) Trim plug and apply one of noted compounds. See Figure 201 for application of sealant compound.

NOTE: Metallic surfaces receiving the plug overcoating shall be prime coated with EC 1662 primer and air dried for at least 30 minutes prior to application of sealing compound.

(7) Reduce gaps and relief holes larger than 0.30 inch in width by the addition of doubler plates and fasteners. After repair, seal as outlined in steps (1) through (6), as applicable to size of gaps remaining.

I. Apply Fuselage, Wing, Empennage, Pod, and Pylon Door Sealants.

NOTE: Seal weathertight doors or cover plates, in the noted areas, which are not sealed with O-rings or gaskets as follows:

(1) Apply coat of EC 1662 primer to surface to which the sealant is to be applied. Air dry primer for at least 30 minutes.

(2) Apply a light coat of petrolatum to surface to which the sealant is not to adhere.

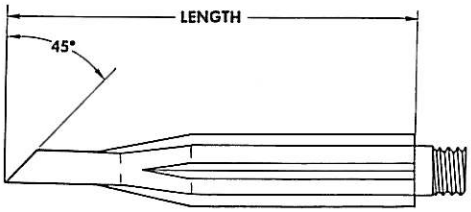
(3) Apply sealing compound EC 1663 or EC 1667 to surface not coated with petrolatum; install door or cover plate. See Figure 201 for application of sealant.

J. Apply Exterior Airframe Fairing Compound. See Figure 203.

(1) Remove all chips, dirt or other foreign material from area to be sealed, using cheesecloth dampened with aliphatic naphtha.

(2) Apply PR 1436 fairing compound to areas to be sealed.

(3) Remove excess compound with clean cheesecloth dampened with aliphatic naphtha.



ENLARGED VIEW OF SEALANT NOZZLE

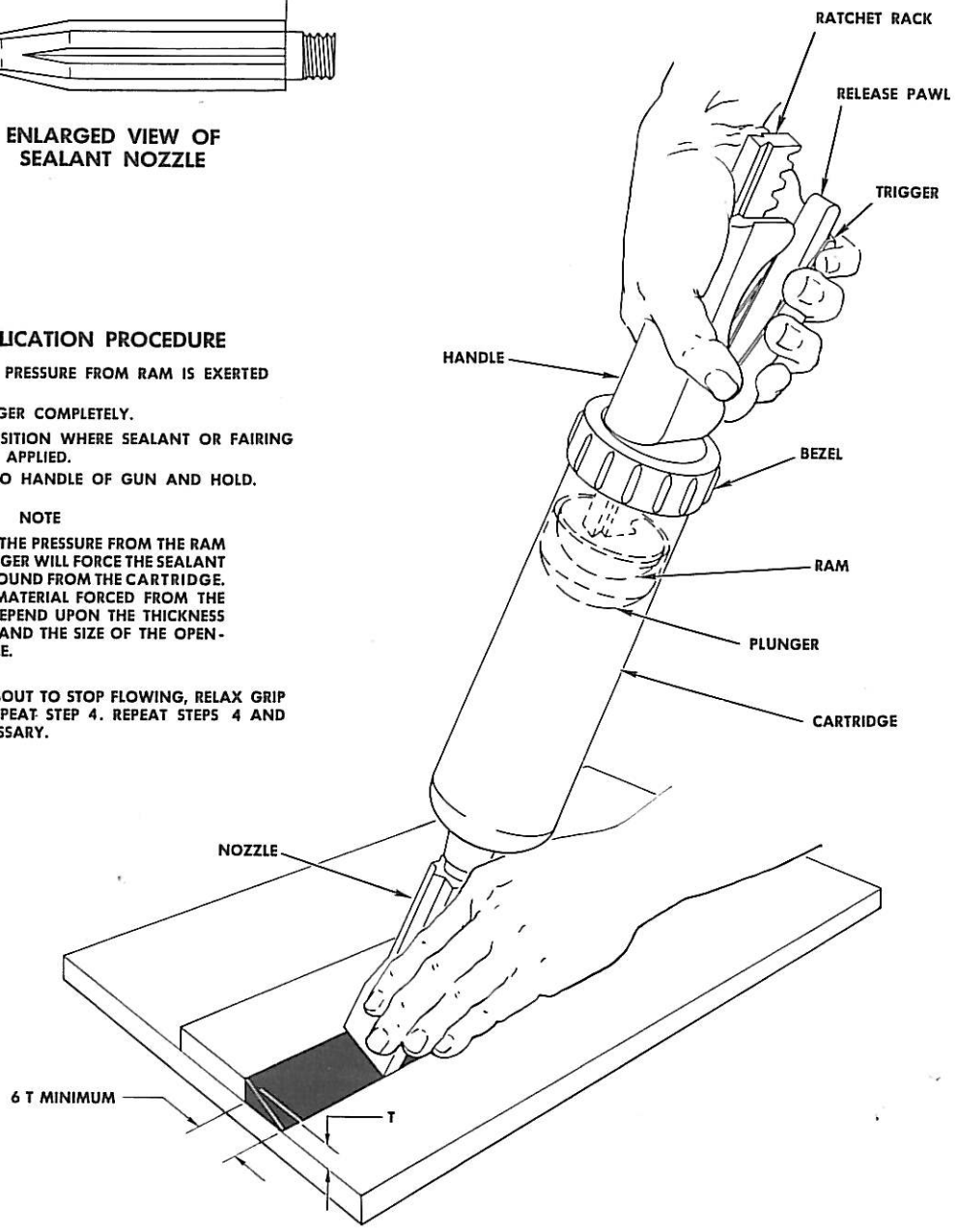
SEALANT APPLICATION PROCEDURE

1. PUMP TRIGGER UNTIL PRESSURE FROM RAM IS EXERTED AGAINST PLUNGER.
2. RELAX GRIP ON TRIGGER COMPLETELY.
3. PLACE NOZZLE IN POSITION WHERE SEALANT OR FAIRING COMPOUND IS TO BE APPLIED.
4. SQUEEZE TRIGGER INTO HANDLE OF GUN AND HOLD.

NOTE

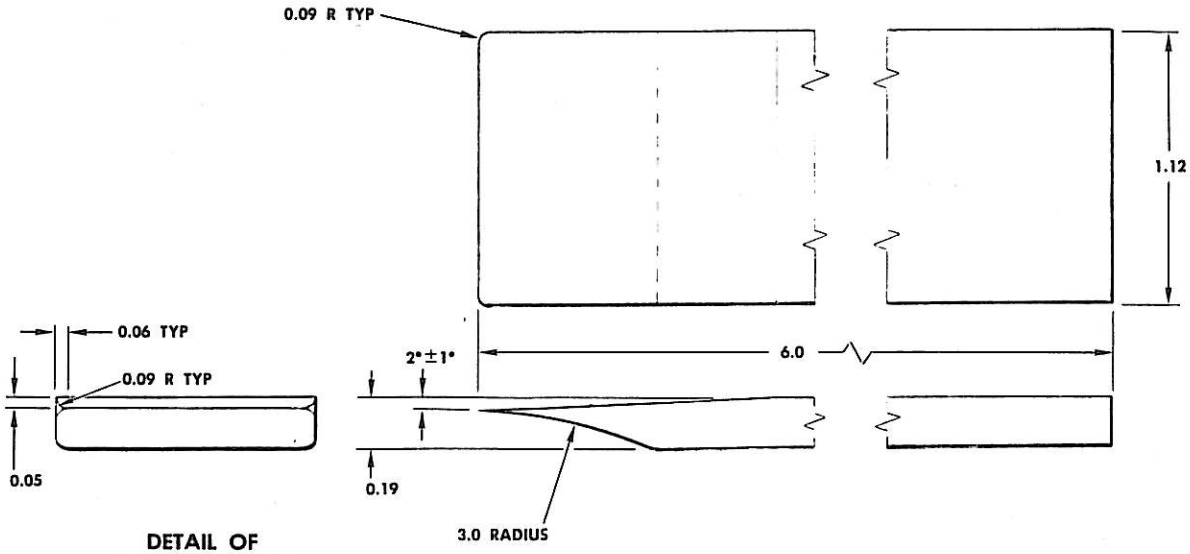
IN THIS POSITION, THE PRESSURE FROM THE RAM AGAINST THE PLUNGER WILL FORCE THE SEALANT OR FAIRING COMPOUND FROM THE CARTRIDGE. THE AMOUNT OF MATERIAL FORCED FROM THE CARTRIDGE WILL DEPEND UPON THE THICKNESS OF THE MATERIAL AND THE SIZE OF THE OPENING IN THE NOZZLE.

5. WHEN MATERIAL IS ABOUT TO STOP FLOWING, RELAX GRIP COMPLETELY, THEN REPEAT STEP 4. REPEAT STEPS 4 AND 5 AS OFTEN AS NECESSARY.



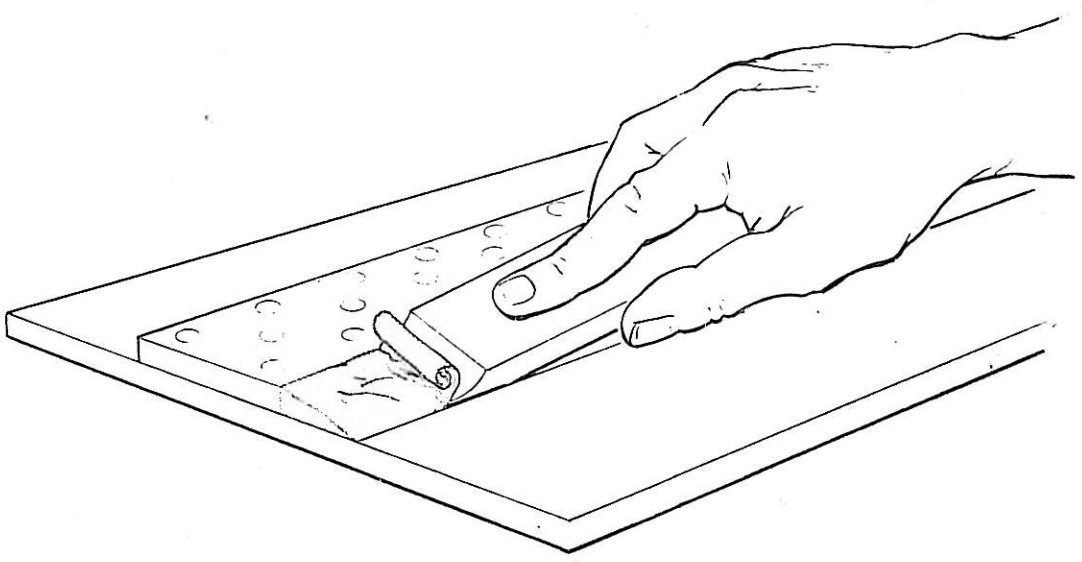
NOTES:
1. HAND GUN CARTRIDGES AND NOZZLES MAY BE PURCHASED FORM SEMCO SALES AND SERVICE, 20 WEST FLORENCE AVENUE, INGLEWOOD 1, CALIFORNIA.

22.03.51.002-1



DETAIL OF TRIMMING TOOL

TOOL MAY BE MADE FROM NYLON



TRIMMING PROCEDURE

22.03.51.002-2A

STRUCTURAL DAMAGE EVALUATION - DESCRIPTION AND OPERATION

1. General

A. Structural Damage Evaluation.

Structural examination is required to evaluate the amount of damage when the airplane has been subjected to any one of the following conditions. Excessive flight conditions such as; hard landings, overweight landing, exceeding flap down speed limitations, exceeding gear down speed limitations, exceeding design "G" load or evasive action, low speed buffeting, excessive turbulence or high speed buffeting which may cause structural damage.

B. External Damage Examination.

Periodically a thorough examination of all exterior surfaces of the airplane should be made to determine the amount or extent of damages as a result of normal airplane operation.

C. Symmetry Check.

A symmetry check of various components of the airplane may be made to determine the cause of a reported unsatisfactory operation, to check for conformance to original dimensions after major repairs, as an aid in evaluation of damage due to excessive flight conditions or to position components correctly during repair.

D. Center of Gravity Limitation.

Center of gravity limitations are given with the airplane on the ground. This information may be particularly useful in emergency lifting and shoring operations as may be required by damage to the airplane.

STRUCTURAL DAMAGE EVALUATION - MAINTENANCE PRACTICES

1. Excessive Flight Conditions - Structural Damage Evaluation (see Figure 201)

A. Hard Landings.

When the airplane exceeds the impact limits upon landing, the following areas will be examined for cracks, pulled or missing fasteners, skin buckles or wrinkles, flaking paint, or as listed. In addition to the structural examination, visually check the airplane for misalignment; conduct a symmetry check if evidence of misalignment is found.

(1) Nose and main landing gear and attaching structure. Refer to Maintenance Manual Chapter 32, LANDING GEAR, for landing gear component check.

(2) Fuselage lower and side skins.

NOTE: Evidence of damage would probably appear first as buckles in the bottom fuselage skins.

(3) Wing-to-fuselage fairings.

(4) Wing-to-fuselage fittings at fuselage stations 678.33, 870.35, and 964.00.

(5) Pylon-to-wing fairing.

(6) Pod and pylon structure.

(7) Aft pressure bulkhead at fuselage station 1487.95 if there is evidence that the tail has contacted the ground.

(8) Translating cowl for freedom of movement and binding.

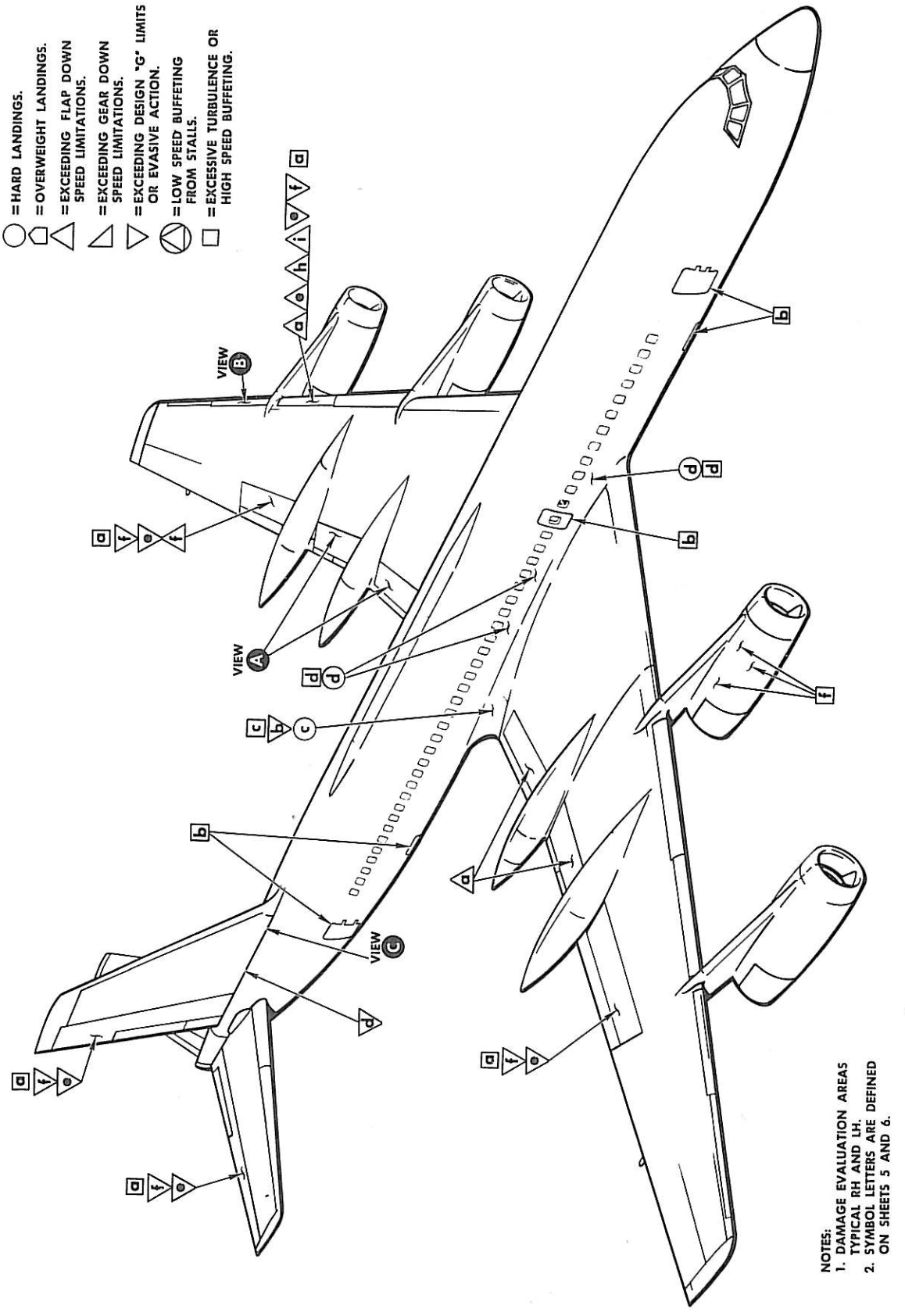
(9) If damage is evident, expose interior structure of (2), (3), (5), (6), (7), and (8) for further examination.

B. Overweight Landings.

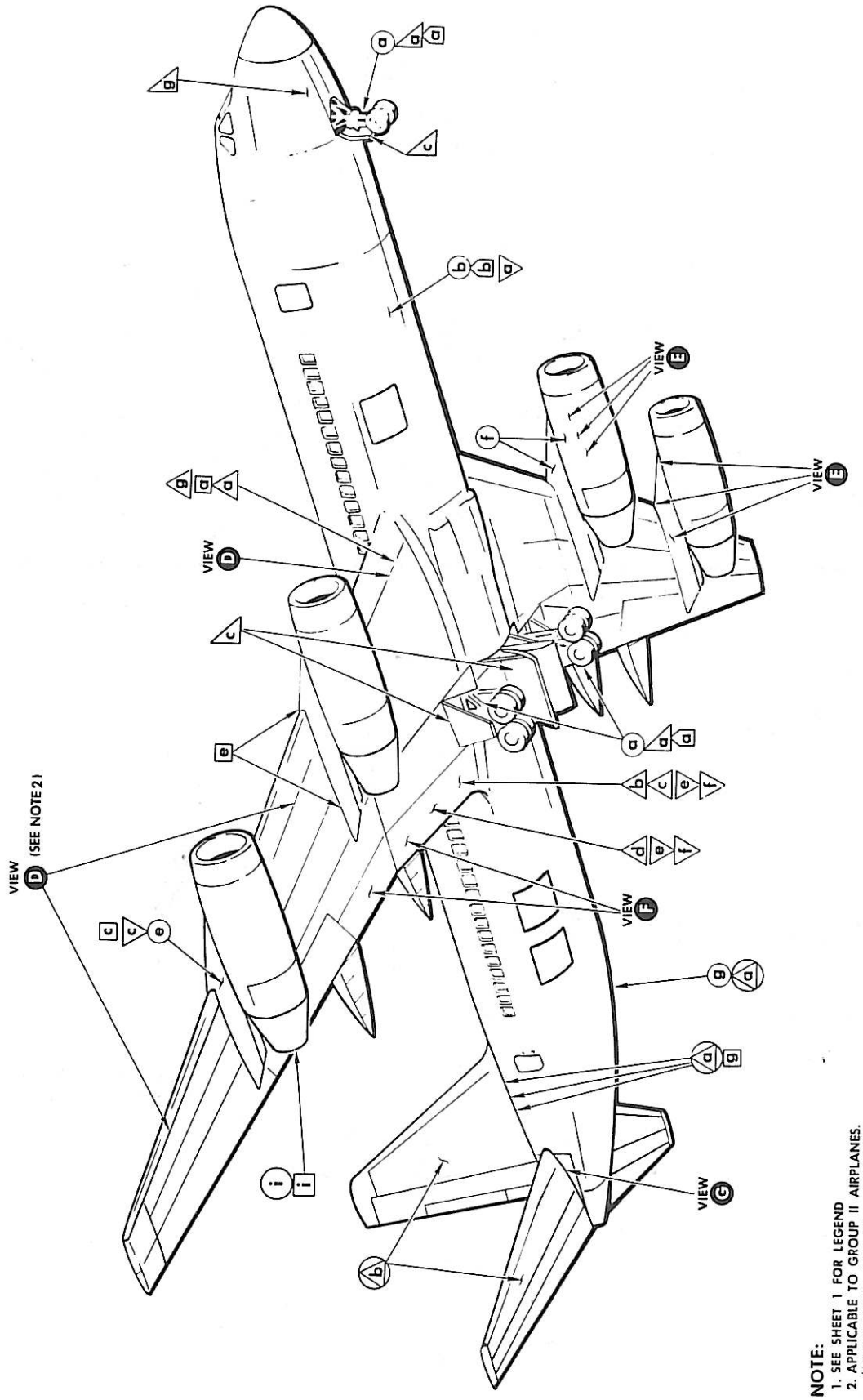
When the airplane has been subjected to an overweight landing condition, with no evidence of being accompanied with a hard landing condition check items 1.A.(1) and (2).

C. Exceeding Flap Down Speed Limitations.

When the flaps are extended at speeds above established limits, the following areas shall be examined for cracks, buckles, or wrinkles, pulled or missing fasteners, and flaking paint, or as listed. See Figure 201 for locations of these areas.



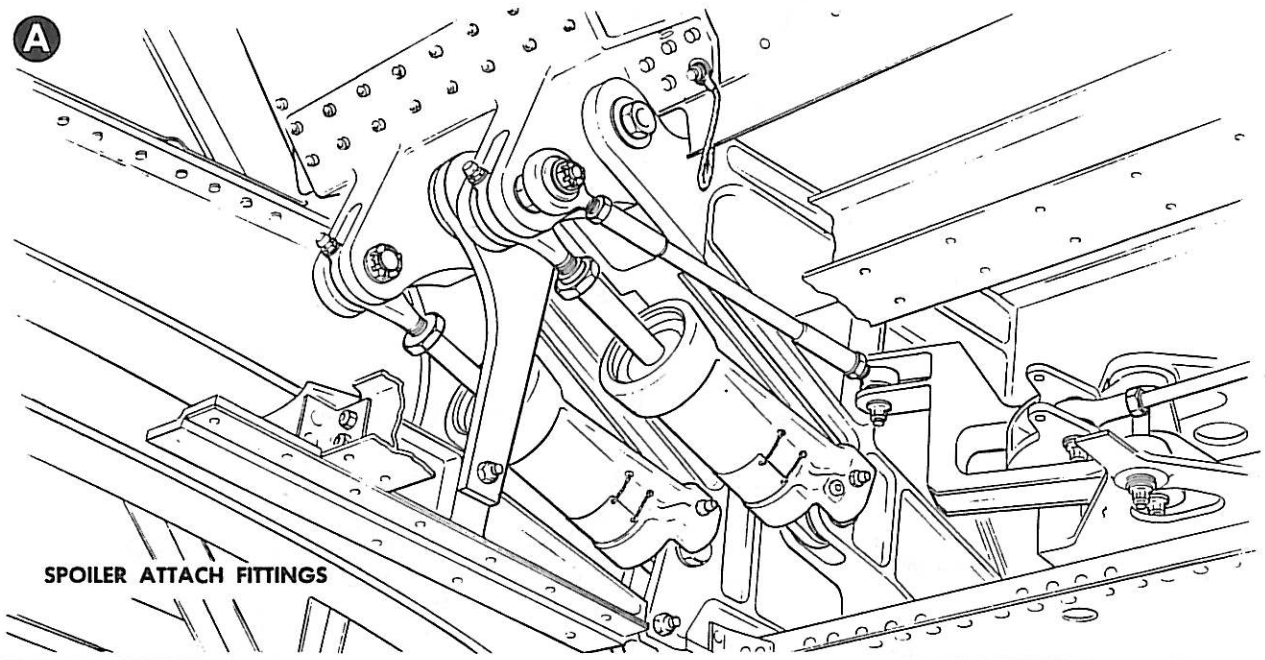
Structural Damage Evaluation
Figure 201 (Sheet 1 of 6)

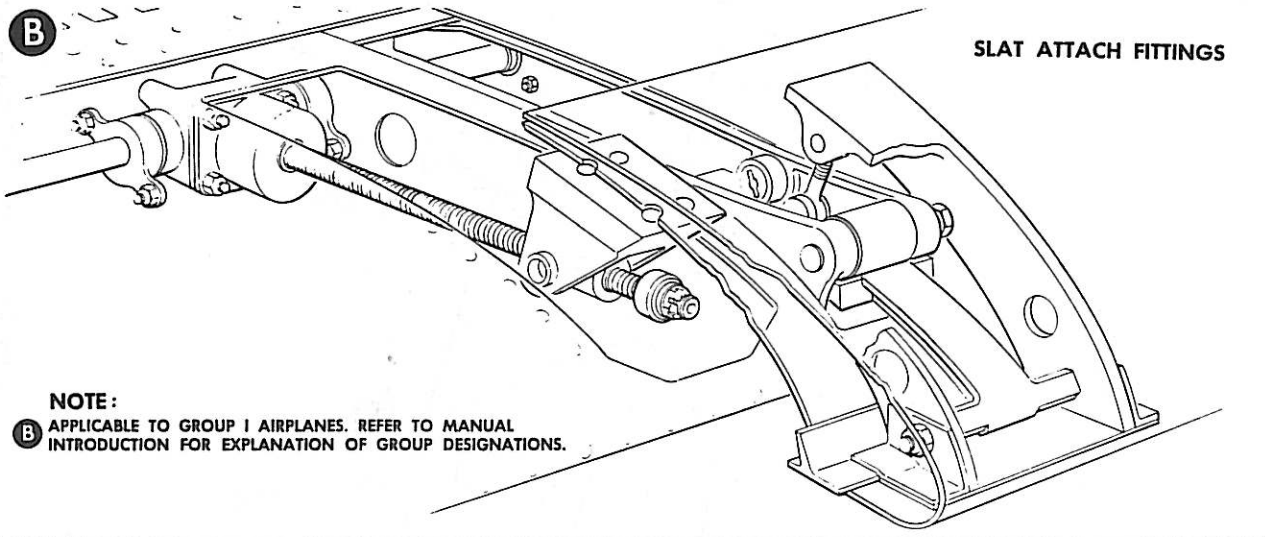


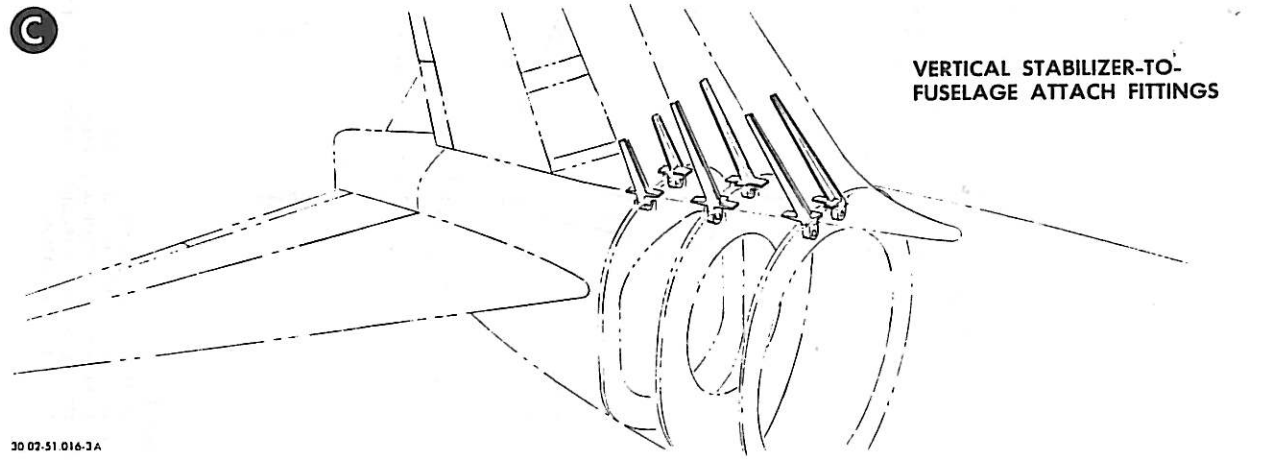
STRUCTURAL DAMAGE EVALUATION

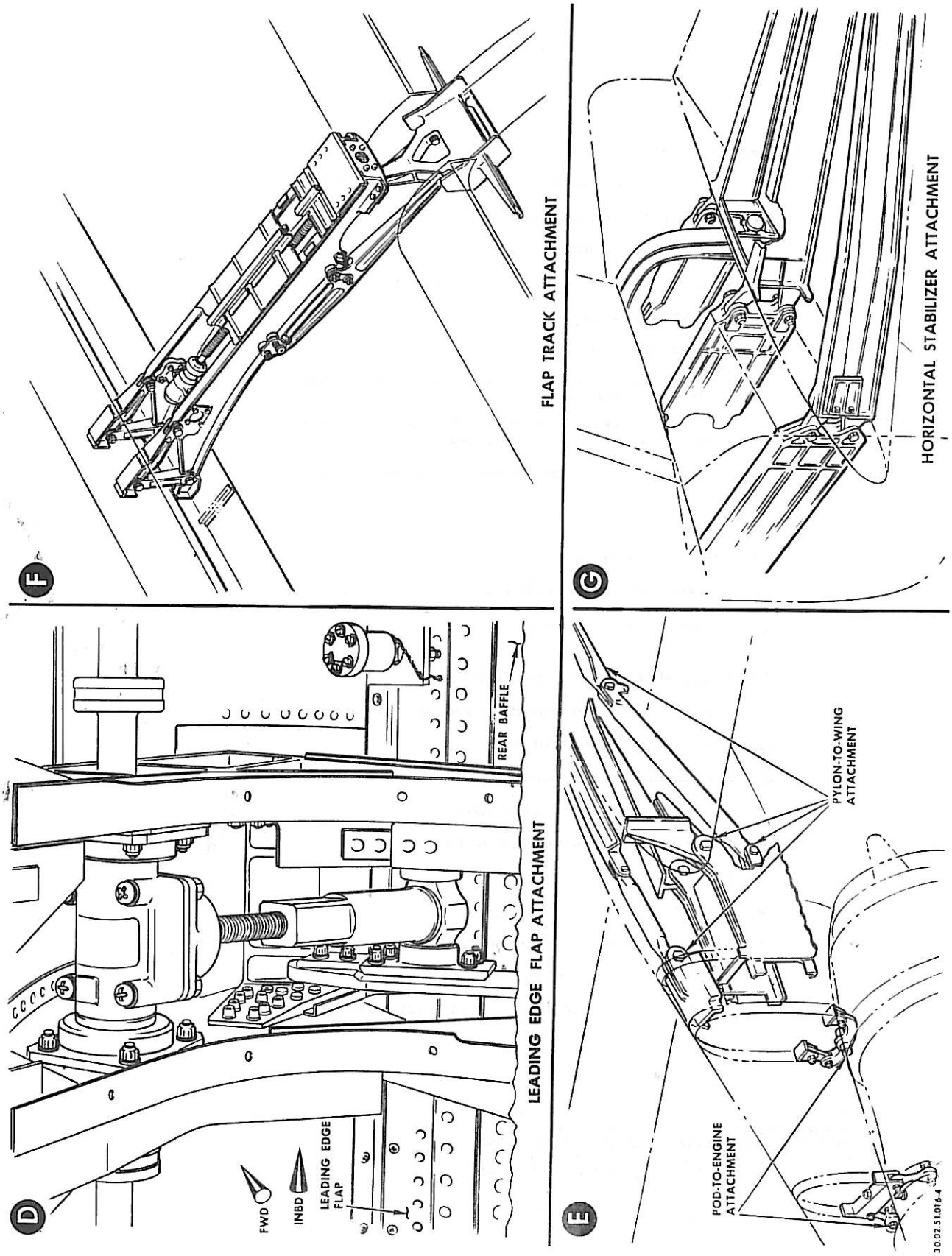
NOTE:
1. SEE SHEET 1 FOR LEGEND
2. APPLICABLE TO GROUP II AIRPLANES. (INTERMEDIATE AND OUTBOARD LEADING EDGES). REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.

30 02 51 016 2-A


A
SPOILER ATTACH FITTINGS


B
SLAT ATTACH FITTINGS
NOTE:
B APPLICABLE TO GROUP I AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.


C
VERTICAL STABILIZER-TO-FUSELAGE ATTACH FITTINGS
30 02-51 016-3A


F
FLAP TRACK ATTACHMENT
G
HORIZONTAL STABILIZER ATTACHMENT
D
REAR BAFFLE
LEADING EDGE FLAP ATTACHMENT
FWD
INBD
LEADING EDGE FLAP
E
PYLON-TO-WING ATTACHMENT
POD-TO-ENGINE ATTACHMENT
30.02.51.016-4

○ HARD LANDINGS.

- (a) NOSE AND MAIN LANDING GEARS AND ATTACHING STRUCTURE.
- (b) FUSELAGE LOWER AND SIDE SKINS.
- (c) WING-TO-FUSELAGE FAIRINGS.
- (d) WING-TO-FUSELAGE FITTINGS AT STATIONS 678.33, 870.35 AND 964.
- (e) PYLON-TO-WING FAIRINGS.
- (f) POD AND PYLON STRUCTURE.
- (g) AFT PRESSURE BULKHEAD; IF THERE IS ANY EVIDENCE THAT THE TAIL CONTACTED THE GROUND.
- (h) INTERIOR STRUCTURE OF (b) (c) (e) (f) (g) SHOULD BE EXPOSED FOR FURTHER EXAMINATION IF DAMGE IS EVIDENT.
- (i) TRANSLATING COWL FOR FREEDOM OF MOVEMENT AND BINDING. (SEE NOTE 2).

⌂ OVERWEIGHT LANDINGS.

- (a) NOSE AND MAIN LANDING GEARS, AND ATTACHING STRUCTURE.
- (b) FUSELAGE LOWER AND SIDE SKINS.

△ EXCEEDING FLAP DOWN LIMITATIONS.

- (a) EXTERNAL SKINS OF FLAPS, SPOILERS, SLATS (SEE NOTE 1) AND KRUGER FLAPS.
- (b) FLAP TRACKS AND ATTACHMENT POINTS.
- (c) FLAP CARRIAGES, BEARINGS, MOUNTING BOLTS. ALSO EXAMINE FOR BINDING.
- (d) TRAILING EDGE RIBS (FLAP ACTUATOR SUPPORT)
- (e) SLAT ACTUATOR ATTACHMENT LUG (SEE NOTE 1).
- (f) SPOILER ATTACHMENT POINTS.
- (g) KRUGER FLAP ATTACHMENT POINTS.
- (h) LEADING EDGE SLATS FOR FREEDOM OF MOVEMENT AND BINDING. (SEE NOTE 1).
- (i) LEADING EDGE SLAT TRACKS AND CARRIAGES (SEE NOTE 1).
- (j) INTERIOR STRUCTURE OF (a) SHOULD BE EXPOSED FOR FURTHER EXAMINATION IF DAMAGE IS EVIDENT.

NOTE:

1. APPLICABLE TO GROUP I AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.
2. APPLICABLE TO GROUP II AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.

30 02 51 016 5A

△ EXCEEDING GEAR DOWN SPEED LIMITATIONS

- [a] MAIN AND NOSE LANDING GEARS AND SUPPORTING STRUCTURE.
- [b] WHEEL WELL STRUCTURES (MAIN AND NOSE LANDING GEARS)
- [c] MAIN AND NOSE LANDING GEAR DOORS.

▽ EXCEEDING DESIGN "G" LOAD LIMITS OR EVASIVE ACTION

- [a] FUSELAGE LOWER AND SIDE SKINS.
- [b] WING-TO-FUSELAGE FAIRINGS.
- [c] PYLON-TO-WING FAIRINGS.
- [d] VERTICAL STABILIZER-TO-FUSELAGE FAIRING.
- [e] ALL CONTROL SURFACES-TO-ADJACENT STRUCTURES.
- [f] ALL CONTROL SURFACE HINGES AND ATTACHING STRUCTURE.
- [g] FUSELAGE, WING, NACELLE, PYLON, VERTICAL AND HORIZONTAL STABILIZER DOORS SHOULD BE EXAMINED FOR PROPER EXTERNAL GAPS AND MISMATCH.
- [h] LOWER SURFACE WING SPLICES AT STATION 224, AND CENTER SPAR STATION 557.
- [i] INTERIOR STRUCTURE OF [a], [b], [c], AND [d] SHOULD BE EXPOSED FOR FURTHER EXAMINATION IF DAMAGE IS EVIDENT.

△ LOW SPEED BUFFETING FROM STALLS

- [a] FUSELAGE BULKHEADS, VERTICAL AND HORIZONTAL STABILIZER ATTACHMENT FITTINGS.
- [b] VERTICAL AND HORIZONTAL STABILIZER SKINS. (INTERIOR STRUCTURE SHOULD BE EXAMINED IF DAMAGE IS EVIDENT).

□ EXCESSIVE TURBULENCE OR HIGH SPEED BUFFETING

- [a] ALL CONTROL SURFACES-TO-ADJACENT STRUCTURE FOR MINIMUM AND MAXIMUM CLEARANCES.
- [b] ALL AIRPLANE DOORS AND ACCESS PANELS FOR MINIMUM AND MAXIMUM EXTERNAL CLEARANCES.
- [c] ALL AIRPLANE FAIRINGS.
- [d] WING-TO-FUSELAGE ATTACHMENT FITTINGS.
- [e] PYLON-TO-WING ATTACHMENT FITTINGS.
- [f] PYLON-TO-ENGINE ATTACHMENT FITTINGS.
- [g] VERTICAL AND HORIZONTAL STABILIZER-TO-FUSELAGE ATTACHMENT.
- [h] LOWER WING SPLICES AT WING STATIONS 69, 224, AND WING CENTER SPAR STATION 557.
- [i] TRANSLATING COWL FOR FREEDOM OF MOVEMENT AND BINDING (SEE NOTE)

NOTE:
APPLICABLE TO GROUP II AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.

30-02-51-016-A-A

(1) External skins of flaps, spoilers, slats *(applicable to Group 1 airplanes), and leading edge flaps.

NOTE: If damage is evident, expose interior structure for further examination.

(2) Flap tracks; track attachment points.

(3) Flap carriages; bearings, mounting bolts, also examine for binding.

(4) Trailing edge ribs that support flap actuator jack screws.

(5) Slat actuator attachment lug; applicable to Group 1 airplanes.

(6) Spoiler attachment points.

(7) Leading edge flap attachment points.

(8) Leading edge slats for freedom of movement and binding; applicable to Group 1 airplanes.

(9) Leading edge slat tracks and carriages; applicable to Group 1 airplanes.

D. Exceeding Gear Down Speed Limitations.

When landing gears are extended at speeds above established limits, the following areas should be examined for cracks, distortion, pulled or missing fasteners, and flaking paint. See Figure 201 for locations of these areas. Refer to Maintenance Manual Chapter 32, LANDING GEAR, for landing gear component check.

(1) Main and nose landing gears and attaching structures.

(2) Wheel well structures (nose and main landing gear).

(3) Main and nose landing gear doors.

E. Exceeding Design "G" Load Limits or Evasive Action.

When the airplane exceeds design "G" load limits, the following areas will be examined for buckles, cracks, and pulled or missing fasteners, or as listed. See Figure 201 for locations of these areas.

(1) Fuselage lower and side skins.

(2) Wing-to-fuselage fairing.

(3) Pylon-to-wing fairing.

(4) Vertical stabilizer-to-fuselage fairing.

(5) If damage is evident, expose interior structure of (1), (2), (3), and (4) for further examination.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

(6) All control surfaces-to-adjacent structure. (Refer to Chapter 51-7-0 for tolerances.)

(7) All control surface hinges and attaching structure.

(8) Examine fuselage, wing, pod, pylon, and vertical and horizontal stabilizer doors for proper external gaps and mismatch. (Refer to Chapter 51-7-0 for tolerances.)

(9) Lower surface wing splices at wing stations 69, 224, and wing center spar station 557 for cracks, distortion, proper gap tolerances, and pulled or missing fasteners.

(10) The upper and lower surfaces of the horizontal stabilizers for indications of skin wrinkles.

(11) Fuselage skin circumferential splices on top of the fuselage at the wing front spar and auxiliary spars, for loose rivets, or rivet working.

(12) Translating cowl for freedom of movement and binding.

(13) The interior structure of (10), (11), and (12) should be exposed for further examination if damage is evident.

F. Low Speed Buffeting From Stalls.

When buffeting occurs during flight, the following areas should be examined. See Figure 201 for location of these areas.

(1) Fuselage bulkheads, vertical and horizontal stabilizer attachment fittings for distortion, cracks, and pulled or missing fasteners.

(2) Vertical and horizontal stabilizer skins, for cracks, distortion, and pulled or missing fasteners.

NOTE: If damage is evident, expose interior structure for further examination.

G. Excessive Turbulence or High Speed Buffeting.

When the airplane has flown through excessive turbulence, the following areas will be examined. See Figure 201 for locations of these areas.

(1) All control surface-to-adjacent structure gaps, for minimum and maximum clearances. (Refer to Chapter 51-7-0, for tolerances.)

(2) All airplane doors and access panels for minimum and maximum external clearances. (Refer to Chapter 51-7-0 for tolerances.)

(3) All airplane fairings for cracks, distortion, and pulled or missing fasteners.

(4) Wing-to-fuselage attachment fittings; for cracks distortion, and pulled or missing fasteners.

NOTE: The upper portion of fittings, accessible only through interior of cabin need not be inspected if no damage is present in the remaining areas.

(5) Pylon-to-wing attachment fitting, for cracks, distortion, and pulled or missing fasteners.

(6) Pylon-to-engine attachment fittings, for cracks, distortion, and pulled or missing fasteners.

(7) Vertical and horizontal stabilizer-to-fuselage attachment fittings, for cracks, distortion, and pulled or missing fasteners.

(8) Lower surface wing splices at wing station 69, 224, and wing center spar stations 557, for cracks, distortion, proper gap tolerances, and pulled or missing fasteners.

2. Inspection/Check - Symmetry Check (see Figures 202, 203, and 204)

A. General.

A symmetry check for various components of the airplane may be made to determine the cause of reported unsatisfactory operation, to check for conformance of original dimensions after major repairs; as an aid in evaluation of damage, or to position components correctly during repair. The airplane symmetry may be checked by direct measurement, as shown on Figure 202.

B. Equipment Required.

(1) Plumb bobs (2).

(2) Roll of tape.

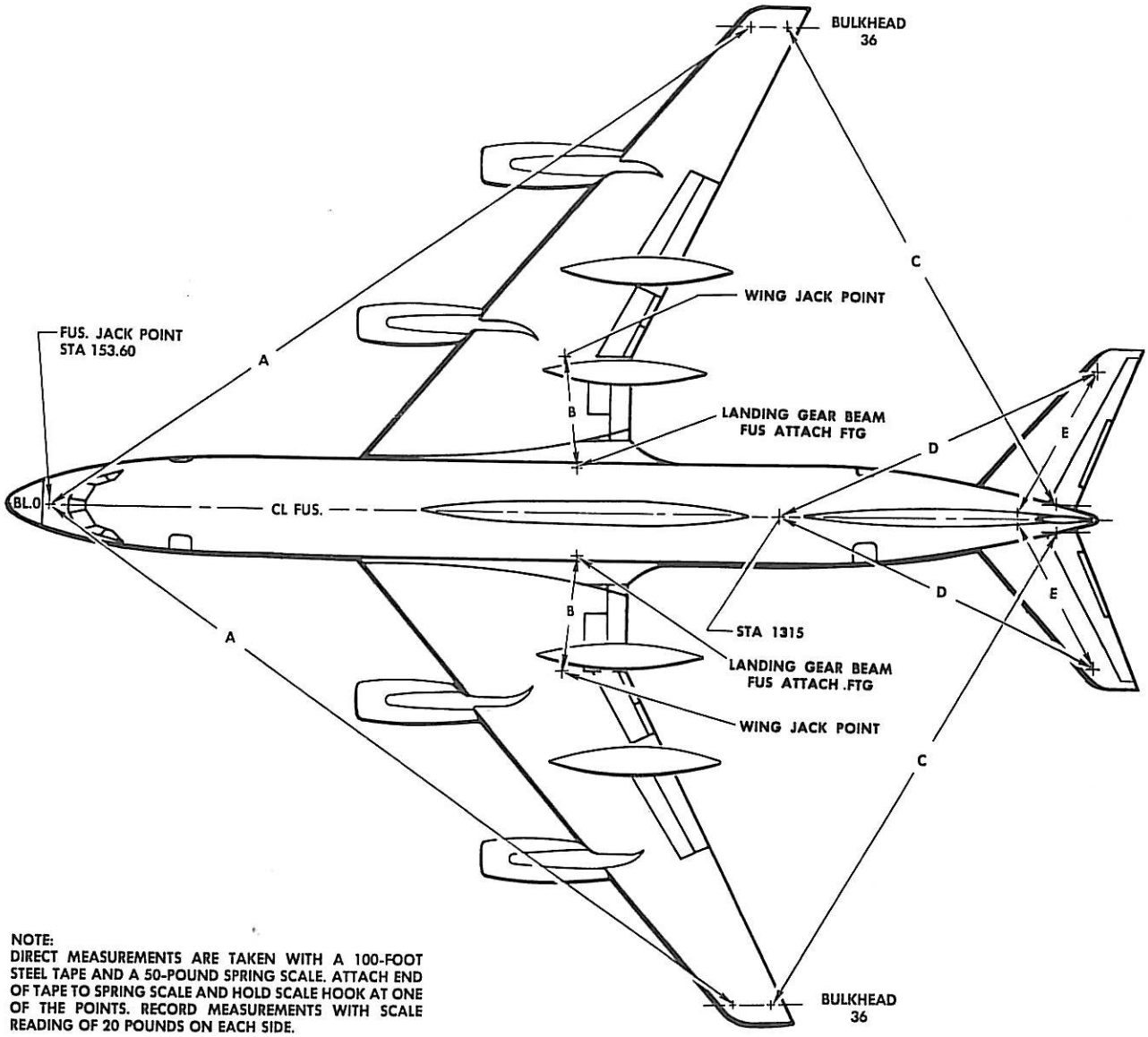
(3) Chalk line cord.

(4) Two-inch plug (2) of local manufacturer.

C. Perform Nacelle Symmetry Check.

NOTE: The nacelle symmetry check points are shown on Figure 203.

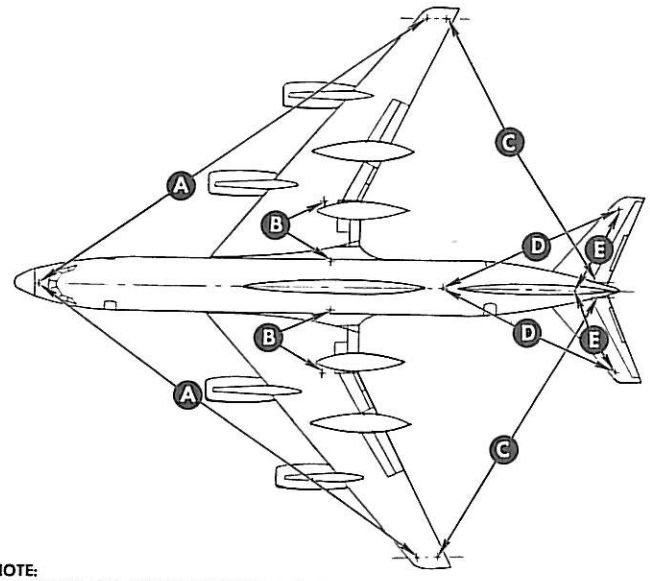
(1) Place airplane in its empty weight configuration.



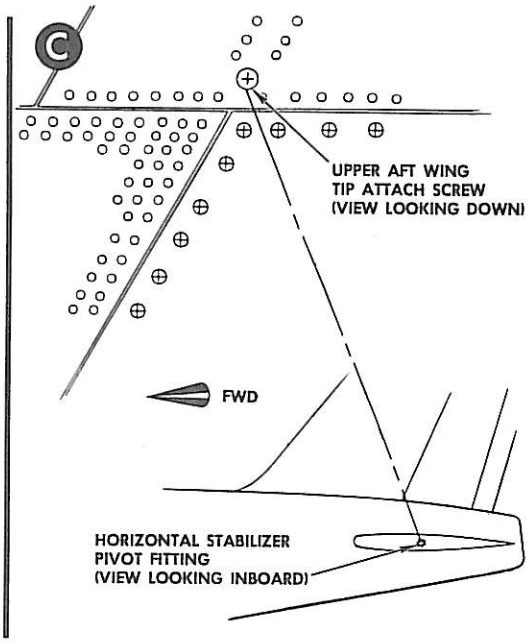
NOTE:
DIRECT MEASUREMENTS ARE TAKEN WITH A 100-FOOT STEEL TAPE AND A 50-POUND SPRING SCALE. ATTACH END OF TAPE TO SPRING SCALE AND HOLD SCALE HOOK AT ONE OF THE POINTS. RECORD MEASUREMENTS WITH SCALE READING OF 20 POUNDS ON EACH SIDE.

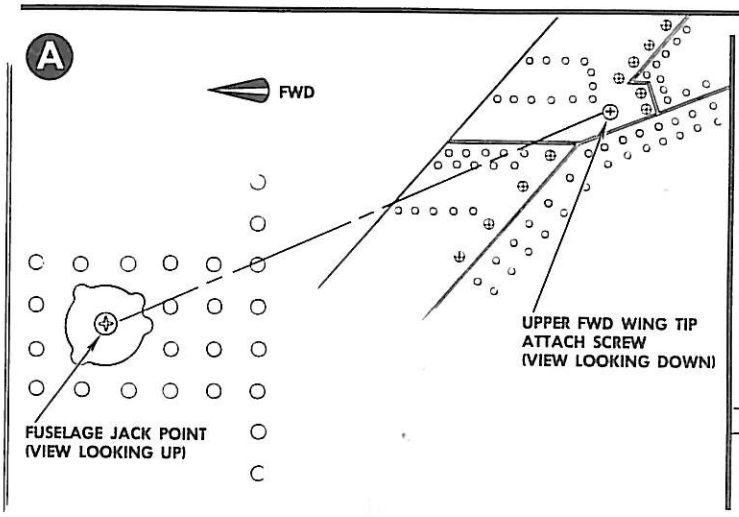
AIRPLANE SYMMETRY CHECK		
DIMENSION	**MEASURED BETWEEN**	**DIFFERENCE SHALL NOT EXCEED**
A	FUS. JACK POINT— UPPER FWD. WING TIP ATTACH SCREW (SEE SHEET 2)	1.00 INCH
B	WING JACK POINT—LANDING GEAR BEAM FUS. ATTACH FITTING (SEE SHEET 2)	0.25 INCH
C	UPPER AFT WING TIP ATTACH SCREW—HOR. STAB. PIVOT FITTING (SEE SHEET 2)	0.60 INCH
D	UPPER FWD HOR. STAB. TIP SCREW—FUS. RIVET BL 0.0 STA 1315 (SEE SHEET 2)	0.50 INCH
E	SHIELD ANTENNA FWD. ATTACH SCREW WL 349.0—FWD HOR. STAB. TIP ATTACH SCREW (SEE SHEET 2)	0.50 INCH

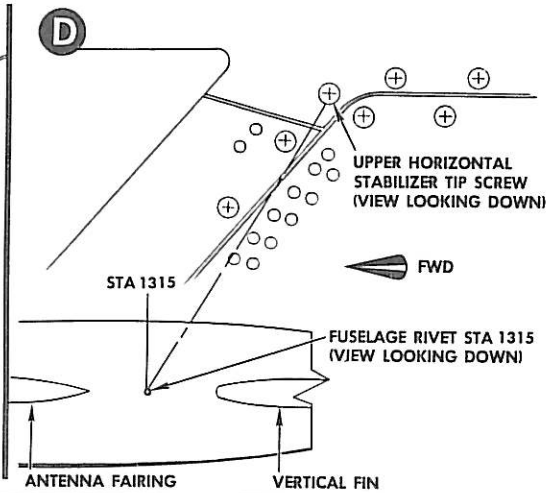
30.02.51.007

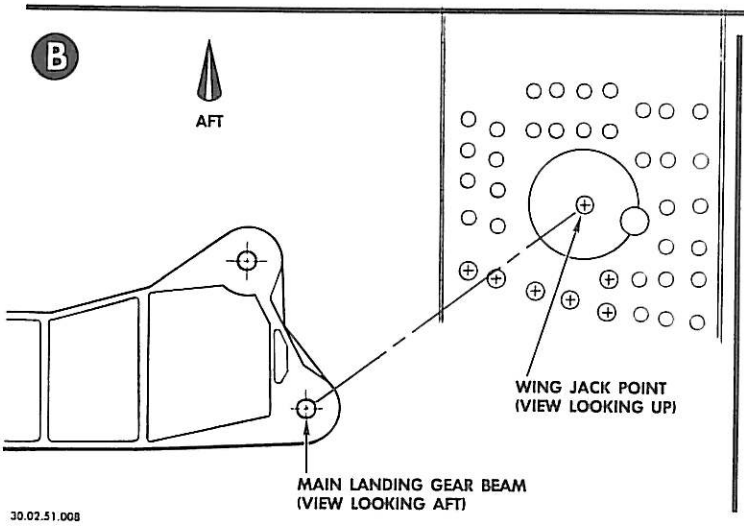


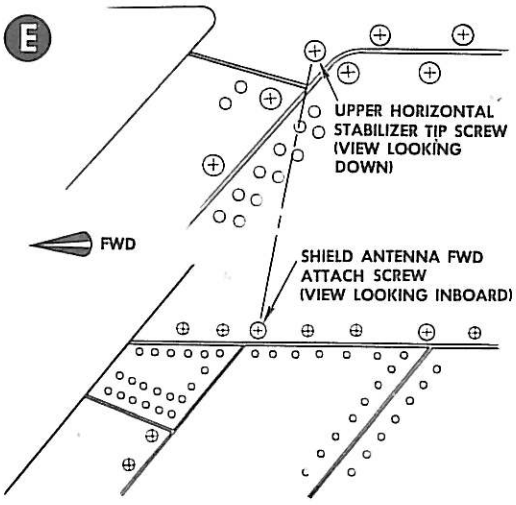
NOTE:
SEE SHEET 1 FOR SYMMETRY TOLERANCES.





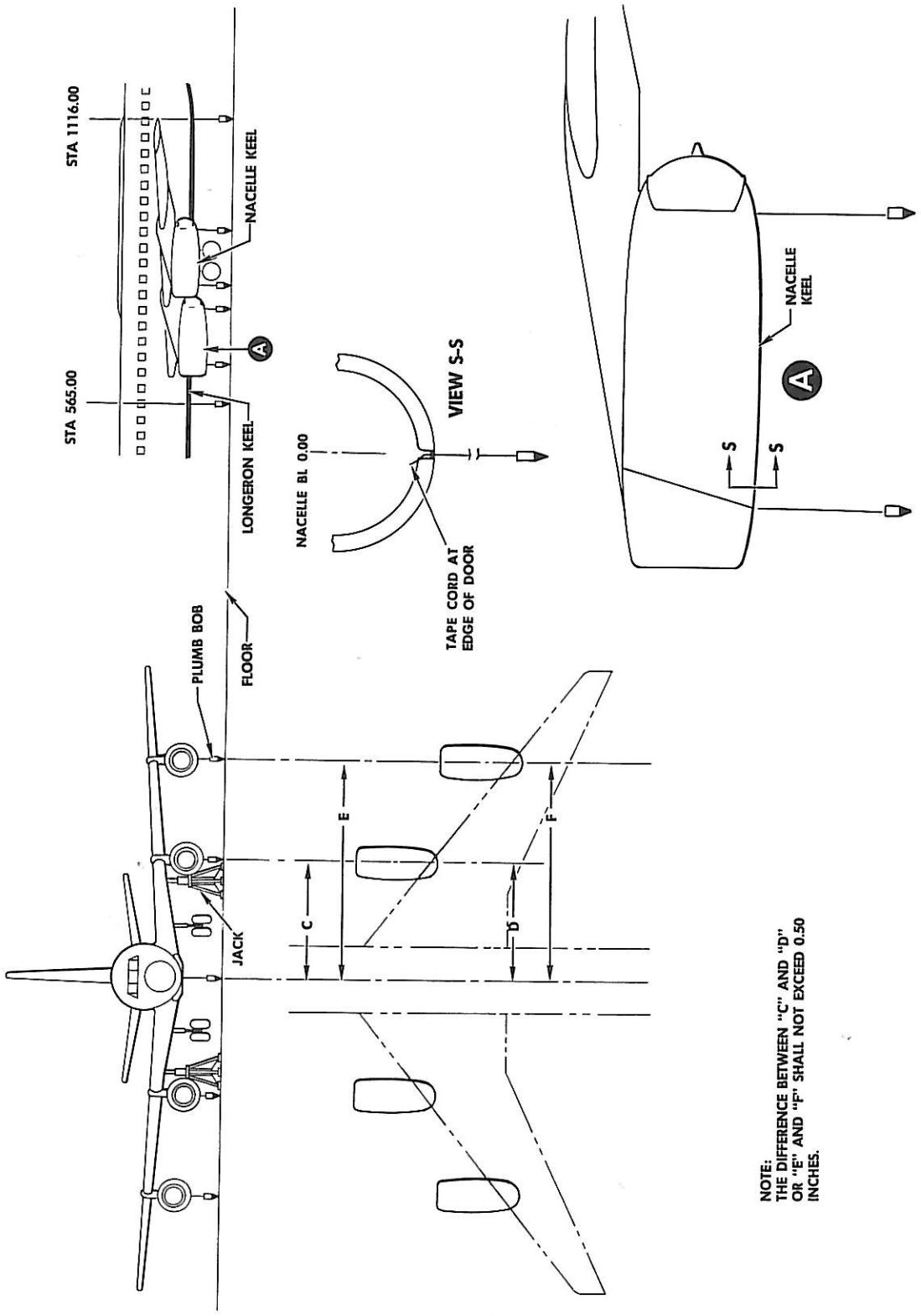


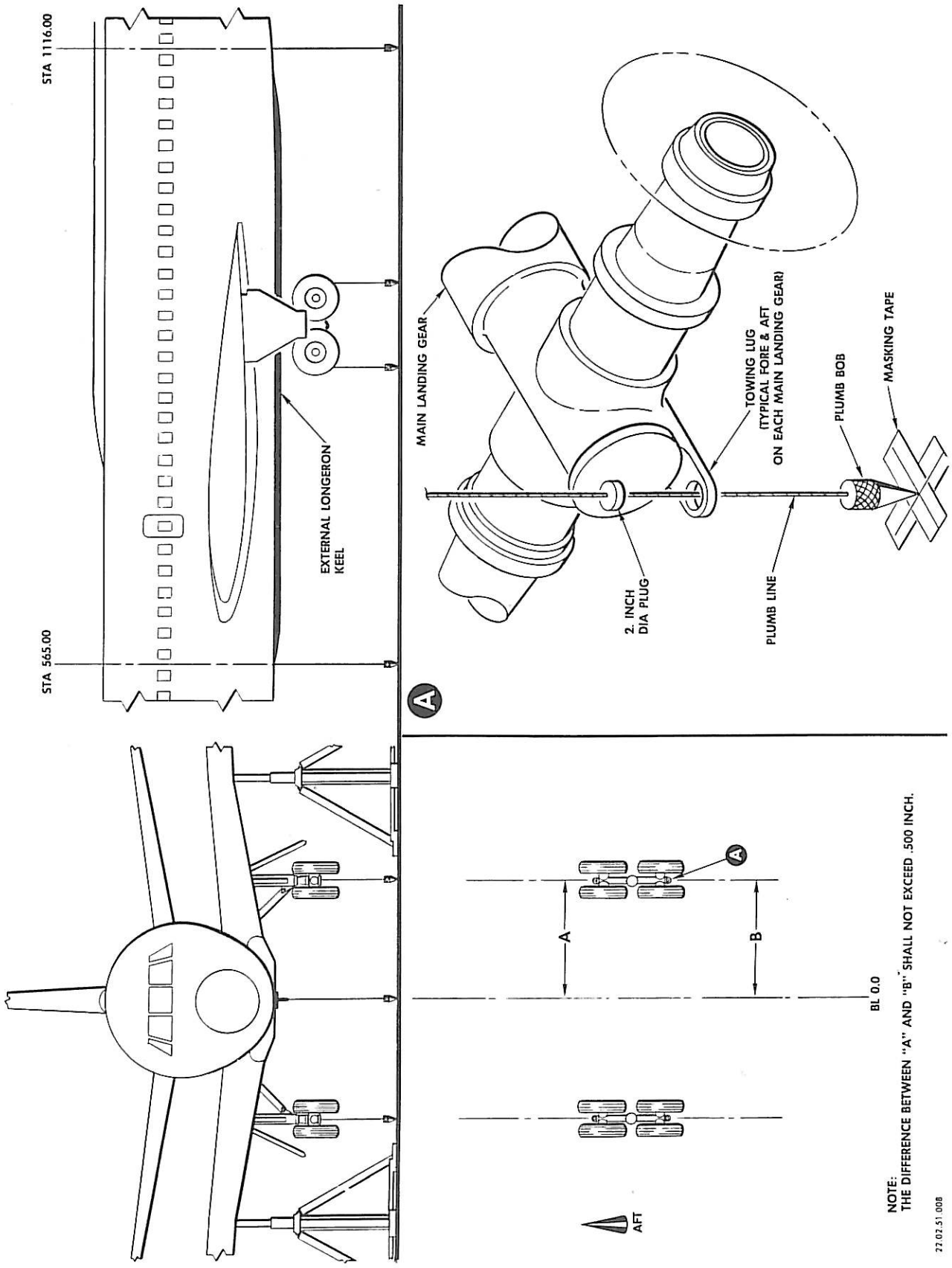




30.02.51.008

Airplane Symmetry Check
Figure 202 (Sheet 2 of 2)


STA 1116.00
STA 565.00
NACELLE KEEL
LONGERON KEEL
A
VIEW S-S
NACELLE BL 0.00
TAPE CORD AT EDGE OF DOOR
NACELLE KEEL
A
S
S
PLUMB BOB
FLOOR
JACK
C
E
D
F
NOTE:
THE DIFFERENCE BETWEEN "C" AND "D" OR "E" AND "F" SHALL NOT EXCEED 0.50 INCHES.
30.02.51.009



Landing Gear Alignment Check
Figure 204

(2) Position airplane on a hard, level floor, in shade, in still air that is not subject to temperature variations.

(3) Raise airplane on fuselage and wing jacks; refer to Chapter 7, LIFTING AND SHORING.

(4) Level airplane with reference to longitudinal and lateral axes; refer to Chapter 8, LEVELING AND WEIGHING.

(5) Drop plumb bobs from BL 0.0 at stations 565.00 and 1116.00, on the external keel, to the floor.

(a) Place a piece of tape on floor under plumb bobs.

(b) Release plumb lines to mark points on tapes.

(6) Extend chalk line between the two established points and snap chalk line to establish BL 0.0.

(7) Drop plumb bob from centerline nacelle keel at front and rear of pod. Release plumb lines to mark a point on tapes.

(8) Measure distances between BL 0.0 and centerline of nacelle, front and rear. Difference shall not exceed 0.50 inch.

D. Perform Main Landing Gear Symmetry Check.

NOTE: The main landing gear symmetry check points are shown on Figure 204.

(1) Perform steps 3.C.(1) through (6).

(2) Drop plumb bobs from center of towing lugs, front and rear, using 2.0 inch diameter plugs.

(3) Measure distance between BL 0.0 and centerline towing lugs, front and rear. Difference shall not exceed 0.50 inch.

ALLOWABLE DAMAGE - DESCRIPTION AND OPERATION

1. General

Allowable damage is any minor damage that does not affect the structural requirements of the components involved. Damage that can be corrected by a simple procedure, without placing restrictions on flight operations, is also considered allowable damage. For detailed information, refer to the Structural Repair Manual.

2. Types of Allowable Damage - Definitions

A. Dents.

Minor dents with no damage to structure, and which will not have an adverse effect on operations.

B. Bends.

Structural members that are slightly bent, often in connection with more serious damage, but can be fully restored to original configuration without cracking or wrinkling.

C. Cracks.

This type of damage cannot be considered allowable until after retarding measures have been taken. Cracks usually originate at edges, holes, radii, or points where concentrated loads are applied; where abrupt changes occur in the cross-sectional area.

D. Holes.

Holes which do not reduce the cross-sectional area of a structural member, which would create areas of elevated stress; or do not interfere with the function of a component, including pressurized or fuel-tight areas.

E. Scratches and Nicks.

Scratches which do not penetrate through the clad surface of a material into the alloy. (Deep scratches may reduce the cross-sectional area of a member and produce localized stress concentrations. This condition can lead to fatigue cracks and possible failure of the component involved.)

Nicks which are not deep enough to constitute a hazard to the strength of the material.

NOTE: Unless a nick is located along or on the edge of a material it is considered to be a scratch; that is, if it is well within the perimeter of the edge, without contacting the edge, of the material.

F. Corrosion.

That damage by corrosion which does not exceed the prescribed limits for scratches.

ALLOWABLE DAMAGE - MAINTENANCE PRACTICES

1. Approved Repairs - Restoration of Allowable Damage

A. General.

The following outlines general procedures necessary for the restoration of allowable damage areas. Refer to the Structural Repair Manual for a complete listing of allowable damage limits and repairs.

B. Equipment Required.

(1) Methyl-Ethyl-Ketone, Federal Specification TT-N-261.

(2) Ten percent solution of sodium hydroxide.

C. Restore Dents.

NOTE: Very minor dents which have not damaged structure, and which have no adverse effect on operations, may remain unrestored to smooth contour with surface. Heavier dents that show evidence of stretching or wrinkling should be treated as a repair. Structural members that have been bent slightly can be fully restored to their original configuration. If the part shows evidence of cracking or wrinkling after restoration it should be replaced. Determine type of material before restoration to original configuration; 2024-T3 and 2024-T4 materials can usually be bumped out or straightened with good results. If another type of material, exercise extreme care to ensure that all cracks are located.

D. Retard Crack Progression.

NOTE: Areas in which a crack can be considered allowable damage are very limited. If there is any doubt of an area (fuel-tight bulkheads, external surfaces, etc.) treat the crack as subject to repair.

(1) Stop-drill crack at both ends with drill. Size of drill must be equal to one and one-half the thickness of the material.

(2) If crack is extremely rough and jagged, rout crack in addition to stop-drilling.

(3) Check crack at frequent intervals after airplane is returned to service to make sure that there is no progression of damage past stop-drilling.

E. Retard Progression of Hole Damage.

NOTE: As with cracks, areas in which holes can be considered allowable damage are very limited. If there is any doubt of an area (fuel-tight bulkheads, external surfaces, etc.) treat the hole as subject to repair.

(1) Stop-drill, round, or fair sharp nicks or cracks which project into the surrounding material from a hole.

(2) Check area at frequent intervals after airplane is returned to service to make sure that there is no progression of damage past area of damage.

F. Restore Scratches and Nicks.

(1) To determine if material's clad surface has been penetrated, exposing the alloy, thoroughly clean the surface with methyl-ethyl-ketone and apply a 10 percent solution of sodium hydroxide to the scratch.

(2) If the scratch has penetrated the clad it will be indicated by a black or dark brown discoloration.

(3) Within two minutes, wash the area thoroughly with water to prevent corrosive action of the solution.

(4) Burnish scratch.

(5) If scratch has penetrated clad, treat with anti-corrosion protective finish; refer to 51-1-0.

(6) Prime and paint area as required.

(7) Burnish and fair in nicks.

G. Retard Corrosion. Remove existing products of corrosion and refinish material, as outlined in 51-1-0.

TEMPORARY REPAIRS - DESCRIPTION AND OPERATION

1. General

A temporary repair is that repair necessary to restore the airplane's airworthiness for flight to an overhaul base, or to allow completion of a scheduled flight. This type of repair allows the airplane to remain in service temporarily, or to transport it to a base where a permanent repair can be made.

2. Temporary Repairs - Definitions and Limitations

A. Fuselage Skin External Repair.

A repair over the external area of skin damage.

B. Horizontal and Vertical Stabilizer Skin External Repair.

A repair over the external area of skin damage. This type of repair is not applied over areas of metal honeycomb.

C. Horizontal Stabilizer Tip Repair.

A repair over the external area of skin damage.

D. Rudder and Elevator Skin Repair.

A repair over the external area of skin damage.

E. Nose Landing Gear Door Repair.

A repair over the external area of damage to splice frame.

F. Cabin Turbocompressor Access Door Pan Repair.

A repair over the external area of pan damage.

G. Wing Leading Edge Cracked-Out Attachment Hole Temporary Repair.

A repair for cracked-out leading edge attachment hole.

H. Honeycomb Panel Temporary Repair.

A repair over the external area of damage to honeycomb panel.

I. Pod and Pylon Temporary Titanium Skin Repair.

A repair over the external area of damage to pod and pylon titanium skin.

J. Pod and Pylon Temporary Aluminum Alloy Skin Repair.

A repair over the external area of damage to pod and pylon aluminum alloy skin.

TEMPORARY REPAIRS - MAINTENANCE PRACTICES

1. Approved Repairs - Temporary Repairs

A. Equipment Required - None.

B. Apply Fuselage Skin External Repair.

See Figure 201 for application of external repair to fuselage skin.

C. Apply Horizontal or Vertical Stabilizer Skin External Repair.

See Figure 202 for application of external skin repair to horizontal or vertical stabilizer.

D. Apply Horizontal Stabilizer Tip Repair.

See Figure 203 for application of external repair to horizontal stabilizer tip.

E. Apply Rudder or Elevator Skin External Repair.

See Figure 204 for application of external skin repair to rudder or elevator.

F. Apply Nose Landing Gear Door Repair.

See Figure 205 for application of external repair to nose landing gear door frame.

G. Apply Cabin Turbocompressor Access Door Pan Repair.

See Figure 206 for application of repair to cabin turbocompressor access door pan.

H. Apply Cracked-Out Attachment Hole Repair to Wing Leading Edge.

See Figure 207 for application of repair for cracked-out wing leading edge attachment hole.

I. Apply Honeycomb Panel Repair.

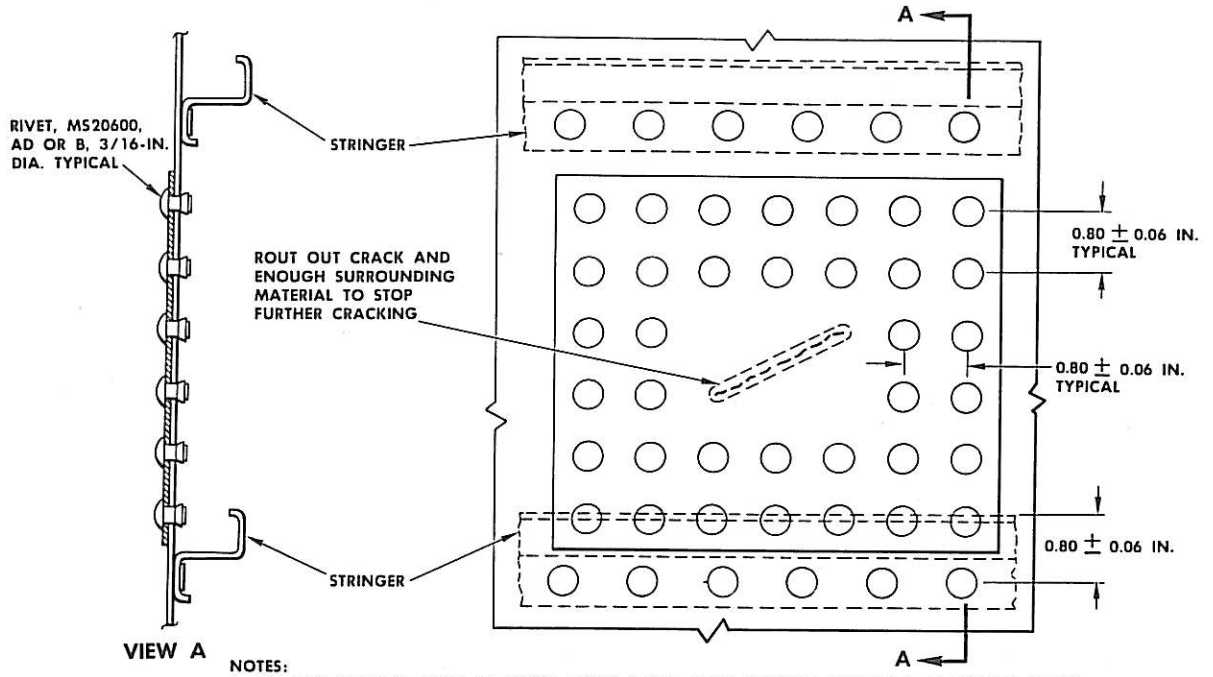
See Figure 208 for application of external repair to honeycomb panel.

J. Apply Pod and Pylon Titanium Skin Repair.

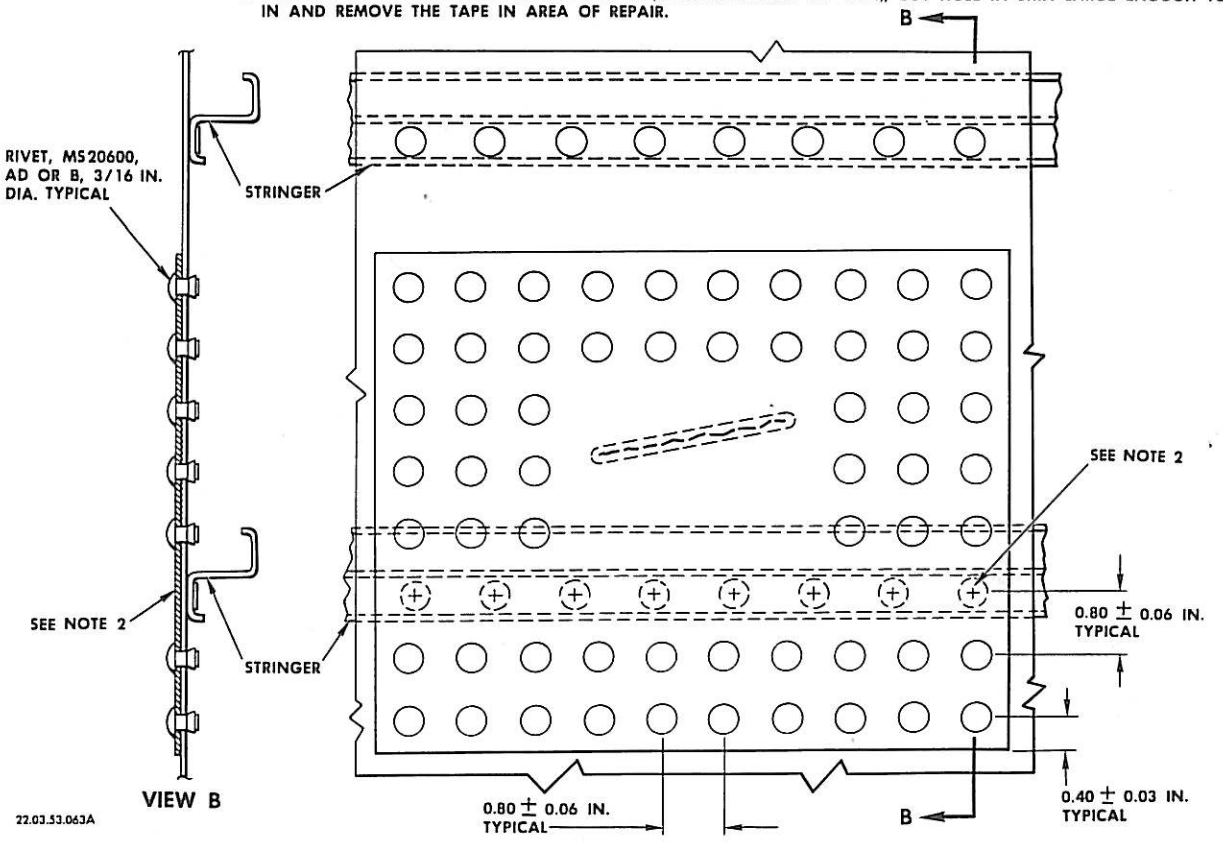
See Figure 209 for application of external repair to pod and pylon titanium skin.

K. Apply Pod and Pylon Aluminum Alloy Skin Repair.

See Figure 210 for application of external repair to pod and pylon aluminum alloy skin.



NOTES:
1. USE TWO TANDEM ROWS OF RIVETS WHEN REPAIR FALLS BETWEEN STRINGERS AS SHOWN ABOVE.
2. IF THE REPAIR PLATE FALLS OVER ONE OR MORE STRINGERS, USE TWO ROWS OF RIVETS ON HORIZONTAL PATTERN AND THREE ROWS ON VERTICAL PATTERN. DO NOT PICK UP EXISTING STRINGER RIVETS AS SHOWN WITH SYMBOL + ON HEAD.
3. USE EQUAL OR NEXT HEAVIER GAGE TO THAT OF THE FUSELAGE SKIN AREA BEING TEMPORARILY PATCHED.
4. APPLY EC1291 SEALANT TO FAYING SURFACES.
5. THE AIRPLANE MAY BE FLOWN FULLY PRESSURIZED AFTER EFFECTING THIS TEMPORARY REPAIR, BUT SHOULD BE REPLACED WITH A PERMANENT REPAIR AT THE EARLIEST OPPORTUNITY.
6. THIS REPAIR IS A TEMPORARY EXTERNAL SKIN REPAIR APPLICABLE, TO ALL AREAS OF FUSELAGE SKINS AND DOORS.
7. FILL THE COUNTERSINKS IN THE SKIN, LEFT BY REMOVING EXISTING RIVETS, WITH THE HEADS OF THE RIVETS REMOVED.
8. IN AREAS OF ALUMINUM SOUNDPROOF TAPE (STATION 926 AFT TO 1394), CUT HOLE IN SKIN LARGE ENOUGH TO REACH IN AND REMOVE THE TAPE IN AREA OF REPAIR.



NOTES:
1. THIS IS A TEMPORARY SKIN REPAIR FOR VERTICAL AND HORIZONTAL STABILIZERS.
2. WHEN TIME PERMITS, TRIM OUT SKIN AS SHOWN INSTEAD OF STOP DRILLING. REMOVE ALL NICKS, BURRS, AND SHARP EDGES.
3. AT THE EARLIEST OPPORTUNITY REPLACE THE EXTERNAL TEMPORARY REPAIR WITH PERMANENT FLUSH REPAIR AS SHOWN IN FIGURE 12.
4. PLAN PERMANENT FLUSH REPAIR CUTOUT AND RIVET PATTERN BEFORE INSTALLING TEMPORARY REPAIR. FOR RIVET SPACING SEE TABLE I.

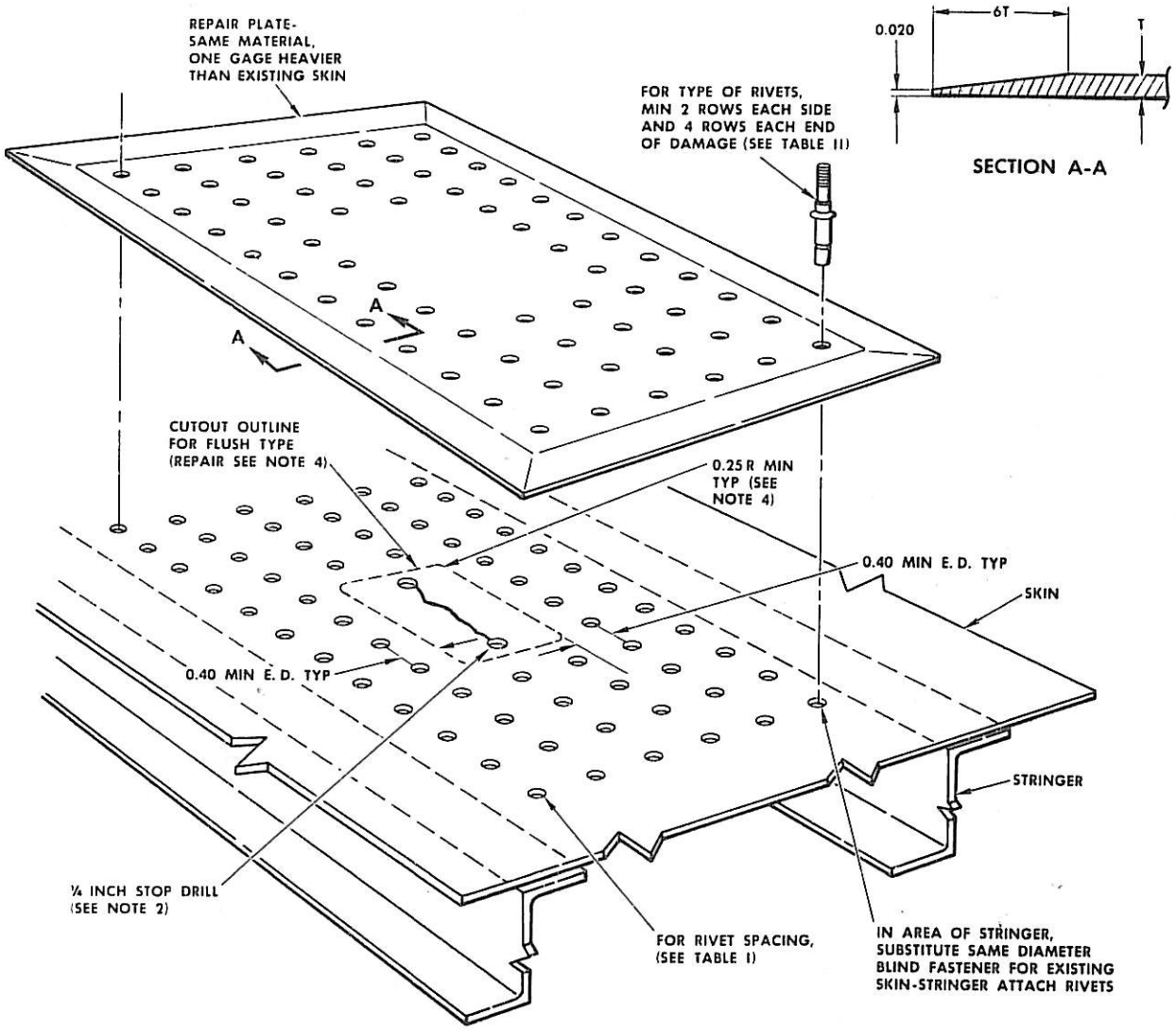
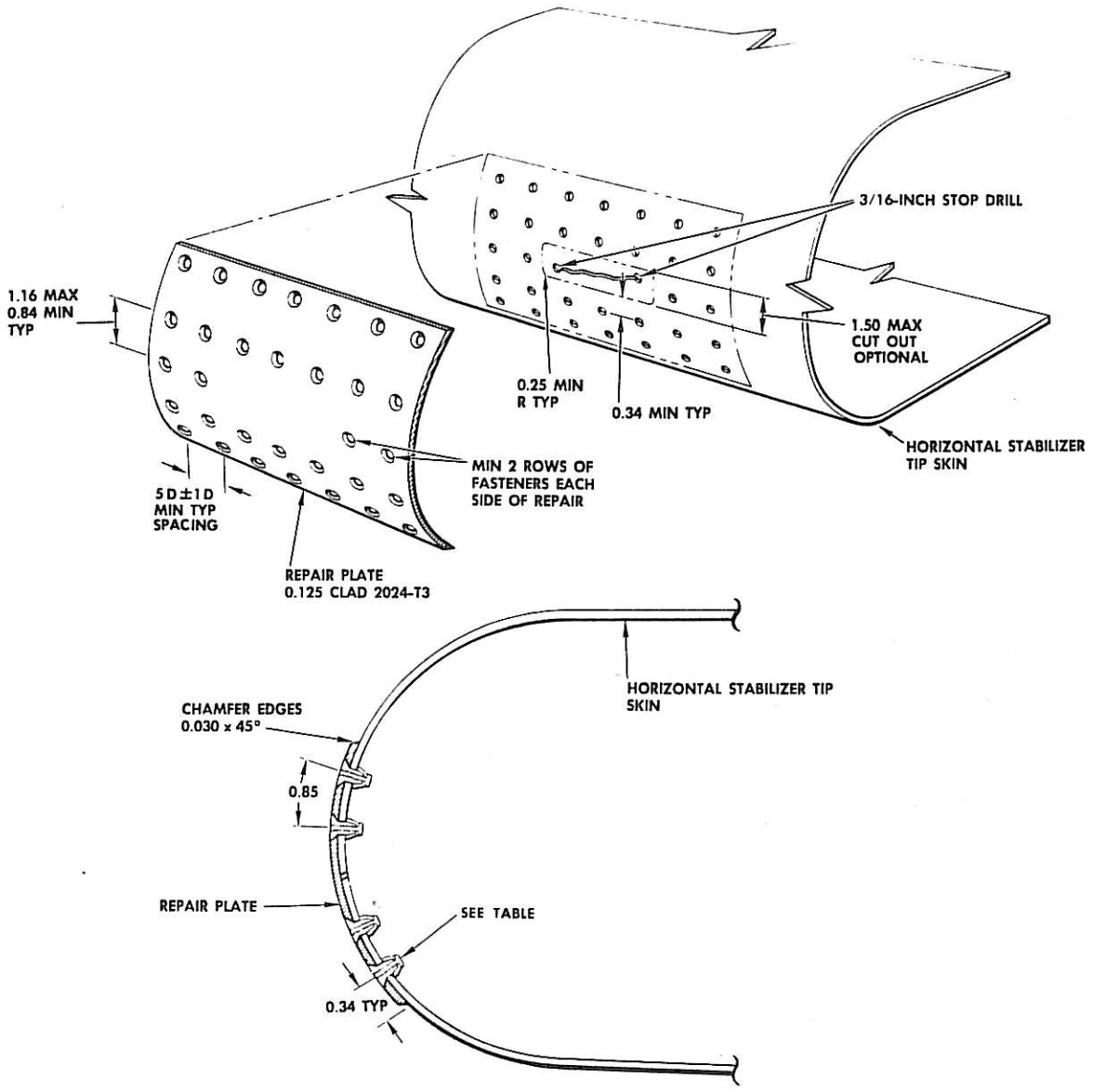


TABLE II		
FASTENER	SIZE	MATL
BB 351	5/32	STEEL
CR 862	5/32	MONEL
MS 20600AD	5/32	AL ALLOY

TABLE I	
SKIN GAGE	RIVET SPACING
0.040	0.96 ± 0.05
0.050	0.88 ± 0.05
0.063	0.86 ± 0.05
0.071	0.82 ± 0.05
0.080	0.80 ± 0.05
0.090	0.78 ± 0.05

27 01 55 038



SECTION THROUGH REPAIR

FASTENER	SIZE	MATERIAL
BB351	5/32	STEEL
CR863	5/32	MONEL
MS20600AD	5/32	AL ALLOY

NOTES:
1. THIS IS A TEMPORARY REPAIR FOR HORIZONTAL STABILIZER TIP SKIN DAMAGE.
2. WHEN NECESSARY, TRIM OUT SKIN AS SHOWN IN LIEU OF STOP DRILLING. REMOVE ALL NICKS, BURRS, AND SHARP EDGES.
3. REPLACE WITH PERMANENT REPAIR AT EARLIEST OPPORTUNITY.

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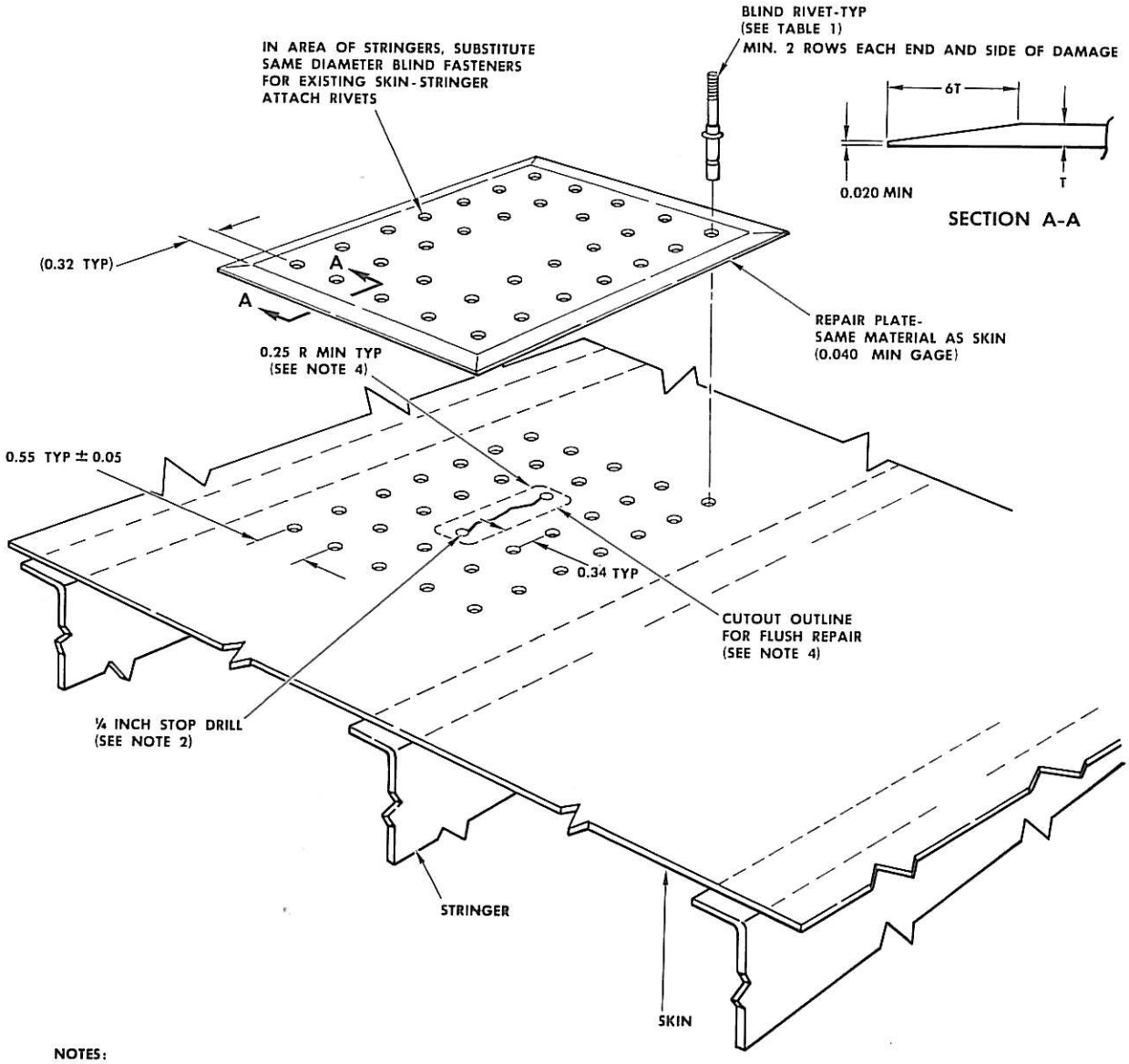
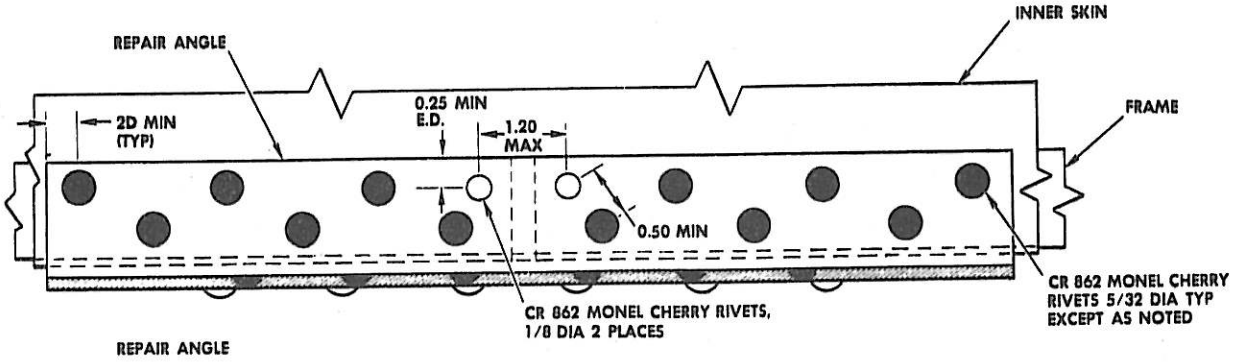


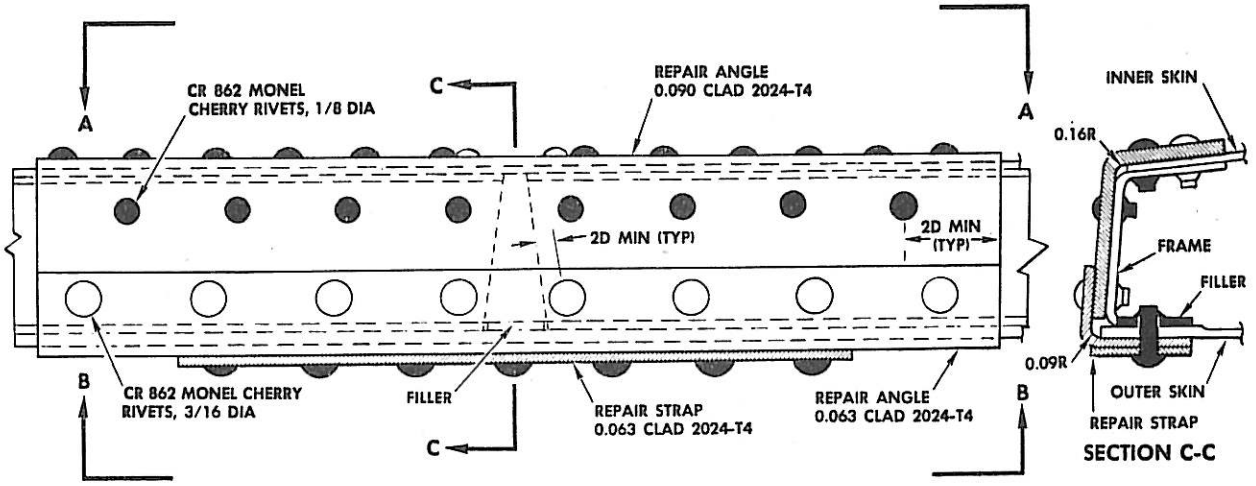
NOTES:
1. THIS IS A TEMPORARY SKIN REPAIR FOR RUDDER AND ELEVATOR SKINS.
2. WHEN TIME PERMITS, TRIM OUT SKIN AS SHOWN INSTEAD OF STOP DRILLING. REMOVE ALL NICKS, BURRS, AND SHARP EDGES.
3. AT THE EARLIEST OPPORTUNITY REPLACE THE EXTERNAL TEMPORARY REPAIR WITH FLUSH REPAIR AS SHOWN IN STRUCTURAL REPAIR MANUAL FIGURE 14.
4. PLAN FLUSH REPAIR CUTOUT AND RIVET PATTERN BEFORE INSTALLING TEMPORARY REPAIR.
5. REBALANCE CONTROL SURFACE AS DIRECTED IN STRUCTURAL REPAIR MANUAL CHAPTER 51, STRUCTURES GENERAL, UPON COMPLETION OF REPAIR.
6. FOR BLIND RIVET INSTALLATION, REFER TO STRUCTURAL REPAIR MANUAL CHAPTER 13, STANDARD PRACTICES-AIRFRAME.

TABLE 1		
FASTENER	SIZE	MATL
CR 862	⅛	MONEL
MS 20600AD	⅛	AL ALLOY

22.03.55.040 A

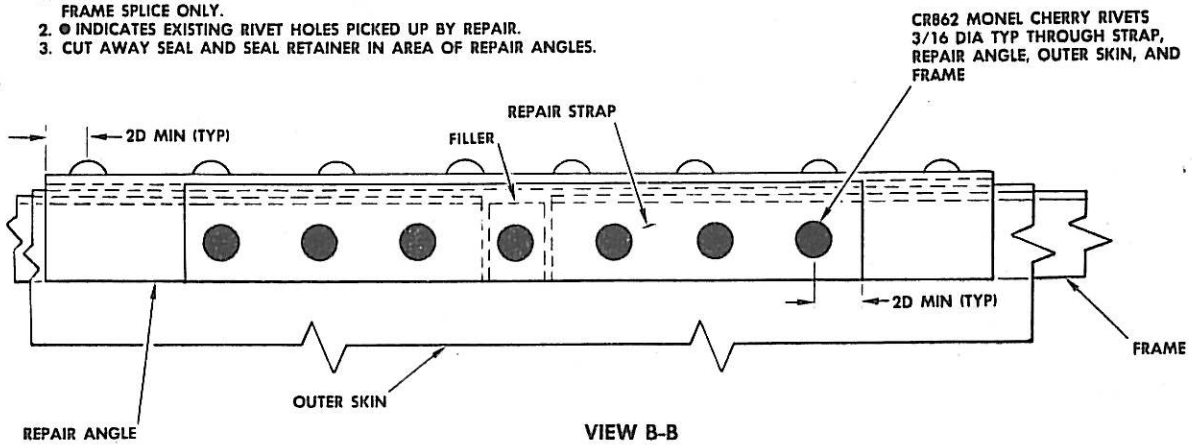


VIEW A-A



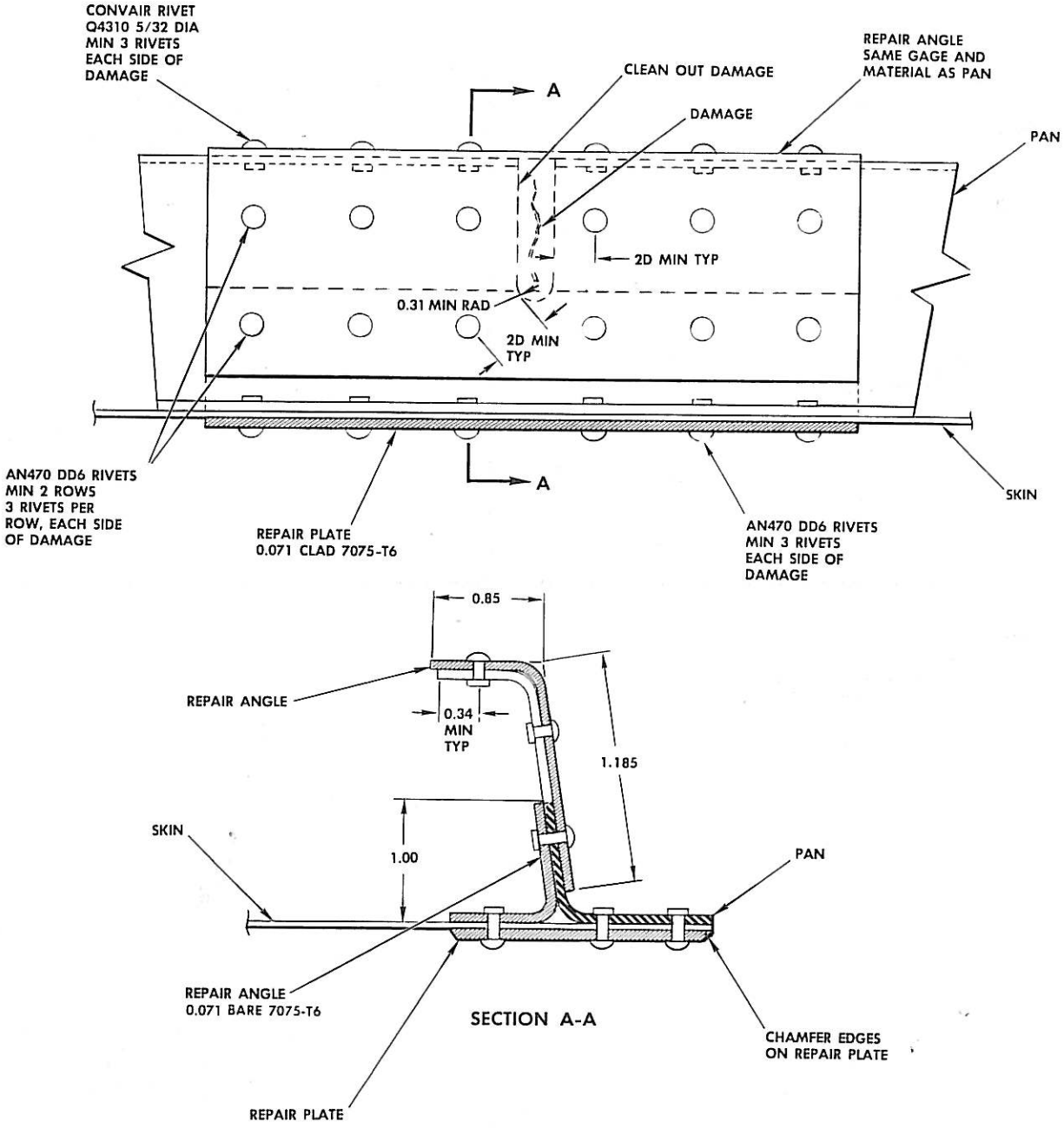
SECTION C-C

NOTES:
1. THIS IS A TEMPORARY REPAIR FOR NOSE LANDING GEAR DOOR FRAME SPLICE ONLY.
2. ● INDICATES EXISTING RIVET HOLES PICKED UP BY REPAIR.
3. CUT AWAY SEAL AND SEAL RETAINER IN AREA OF REPAIR ANGLES.



VIEW B-B

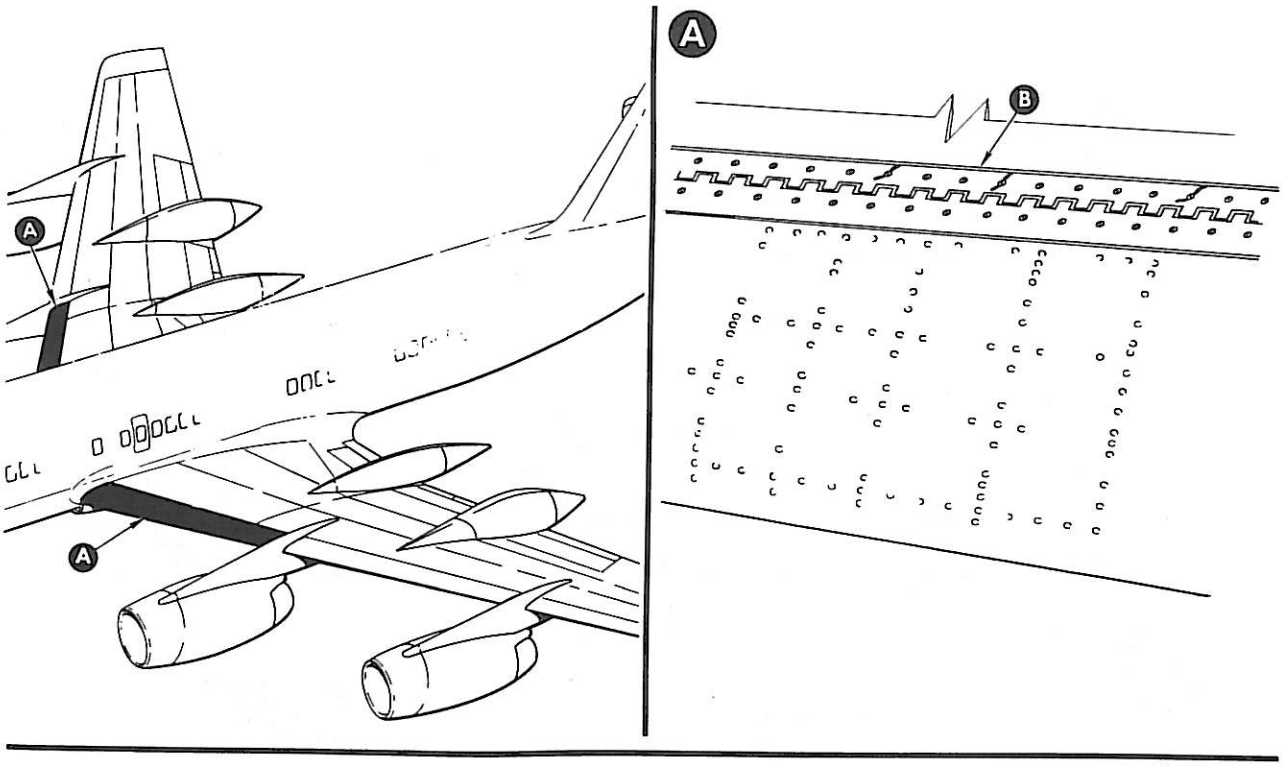
22.03.52.022-2A



NOTE:
THIS TEMPORARY REPAIR APPLICABLE WHEN DAMAGE EXISTS IN SHADED AREA ////////. REPLACE DOOR AT EARLIEST OPPORTUNITY.

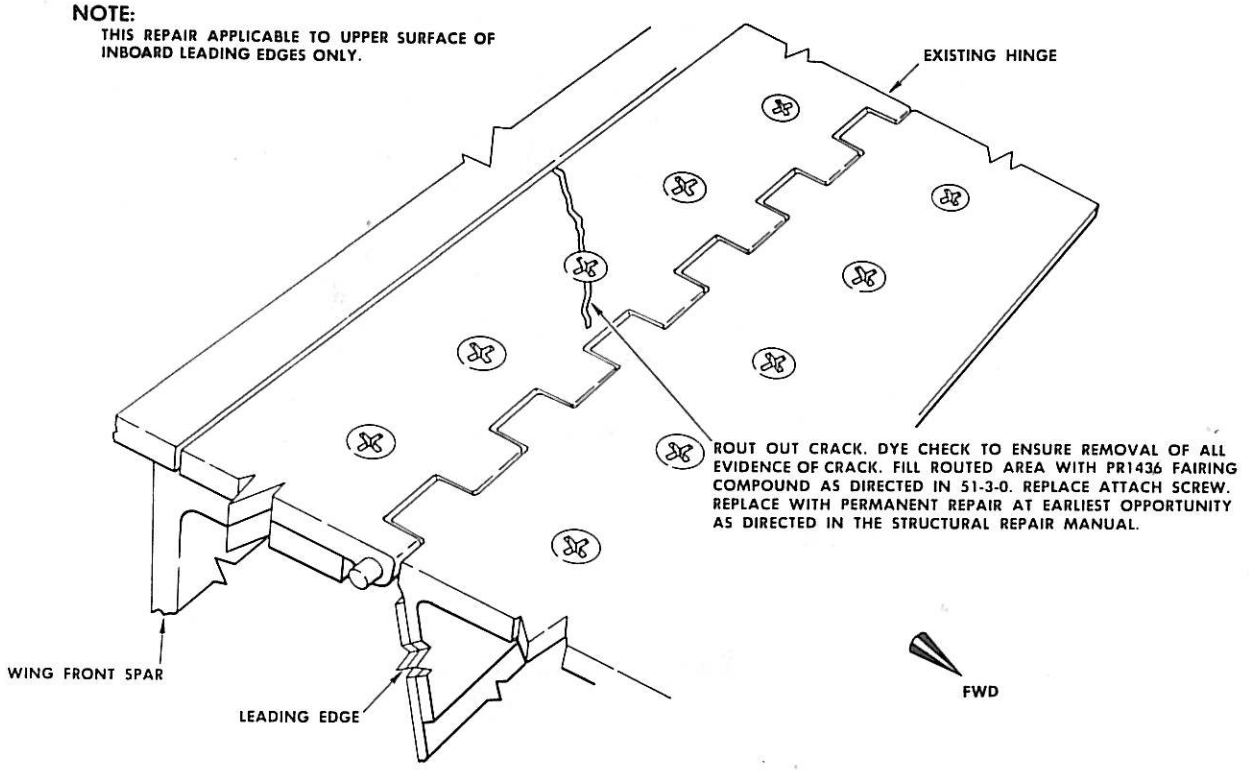
22.03.52.070A

Cabin Turbocompressor Access Door
Temporary Pan Repair
Figure 206



B

NOTE:
THIS REPAIR APPLICABLE TO UPPER SURFACE OF INBOARD LEADING EDGES ONLY.

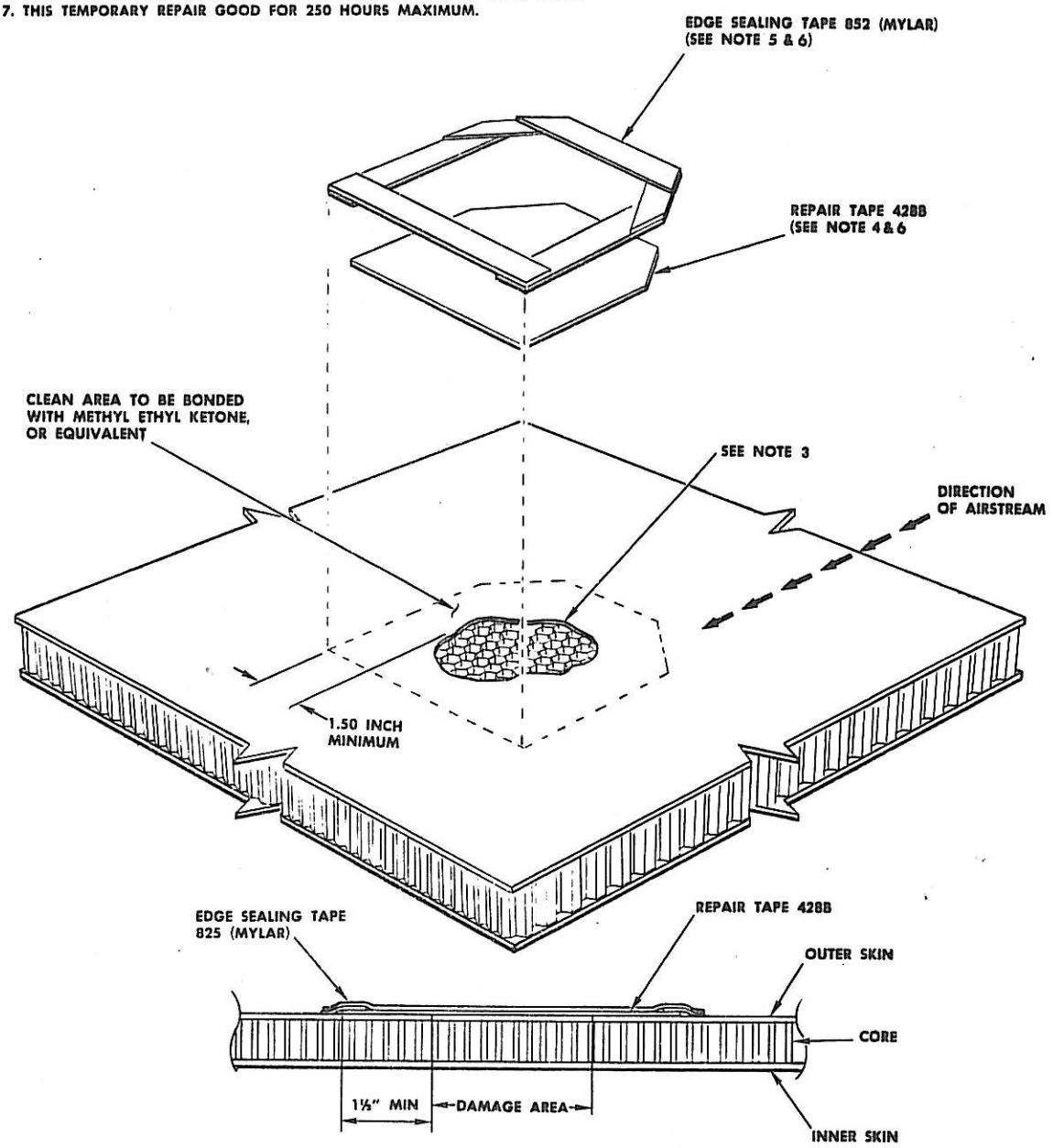


30 02 51 017A

Wing Leading Edge Cracked-Out Attachment Hole Temporary Repair
Figure 207

NOTES:

1. MAXIMUM ALLOWABLE REPAIR FOR FLAPS, AILERONS, ELEVATOR TRAILING EDGE, RUDDER TRAILING EDGE, SHROUDS, SPOILERS, AND FIXED TRAILING EDGE, IS 4.00-INCH DIAMETER OR EQUIVALENT, IN AREA CONTAINED IN A RECTANGLE WITH WIDTH-TO-LENGTH RATIO OF 4 TO 1.
2. MAXIMUM ALLOWABLE REPAIR FOR TABS AND AILERON BALANCE BOARDS IS 2.00-INCH DIAMETER OR EQUIVALENT, IN AREA CONTAINED IN A RECTANGLE WITH WIDTH-TO-LENGTH RATIO OF 4 TO 1.
3. SMOOTH SHARP EDGES TO A RADIUS; DO NOT DAMAGE CORE.
4. REPAIR TAPE OVERLAPS DAMAGE BY 1.50 INCH MINIMUM.
5. SEAL EDGES OF REPAIR TAPE TO PREVENT PEELING BY AIRSTREAM.
6. TAPE 428B AND 852 (MYLAR) AVAILABLE FROM 3 M CO., ST. PAUL, MINN.
7. THIS TEMPORARY REPAIR GOOD FOR 250 HOURS MAXIMUM.



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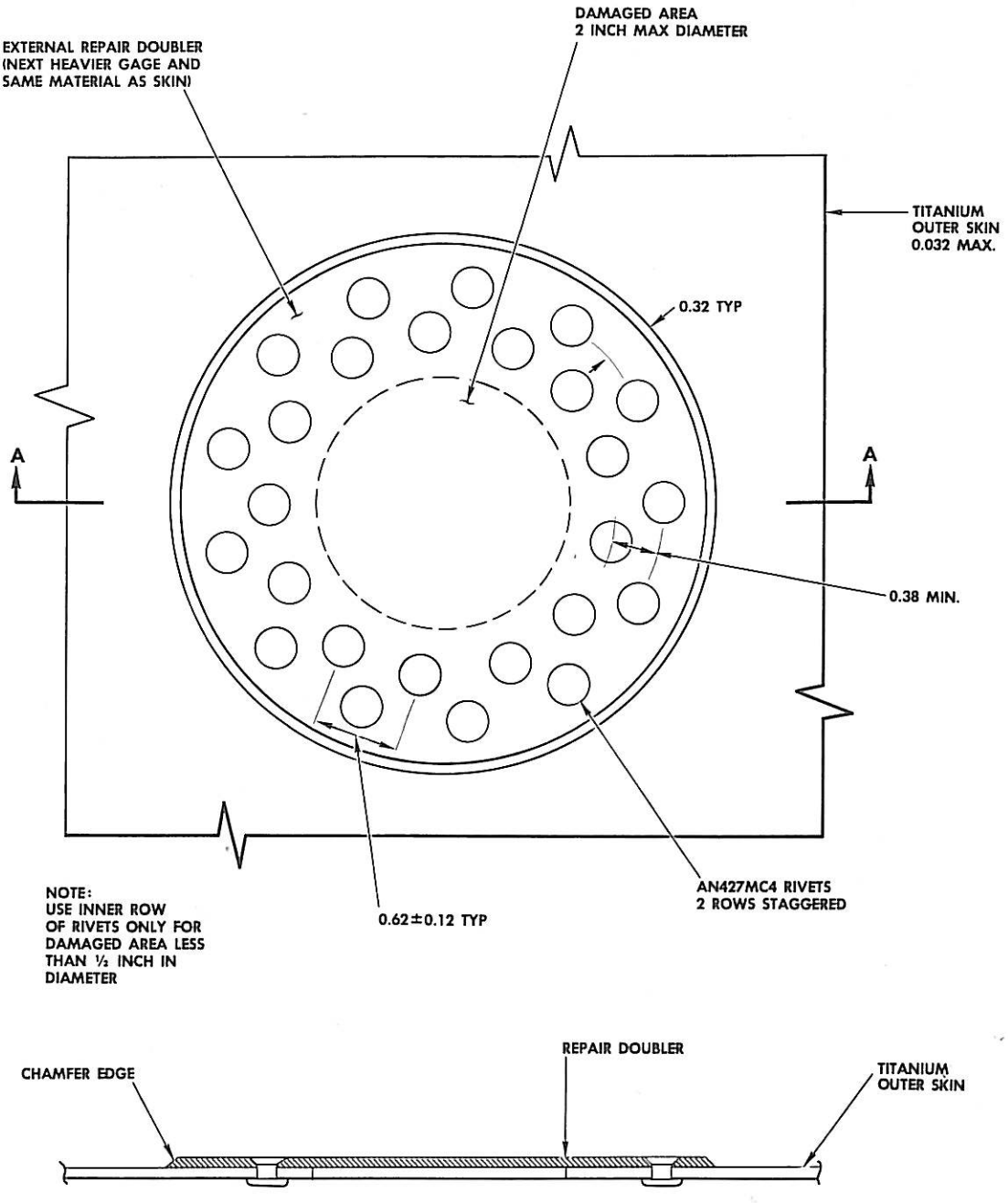
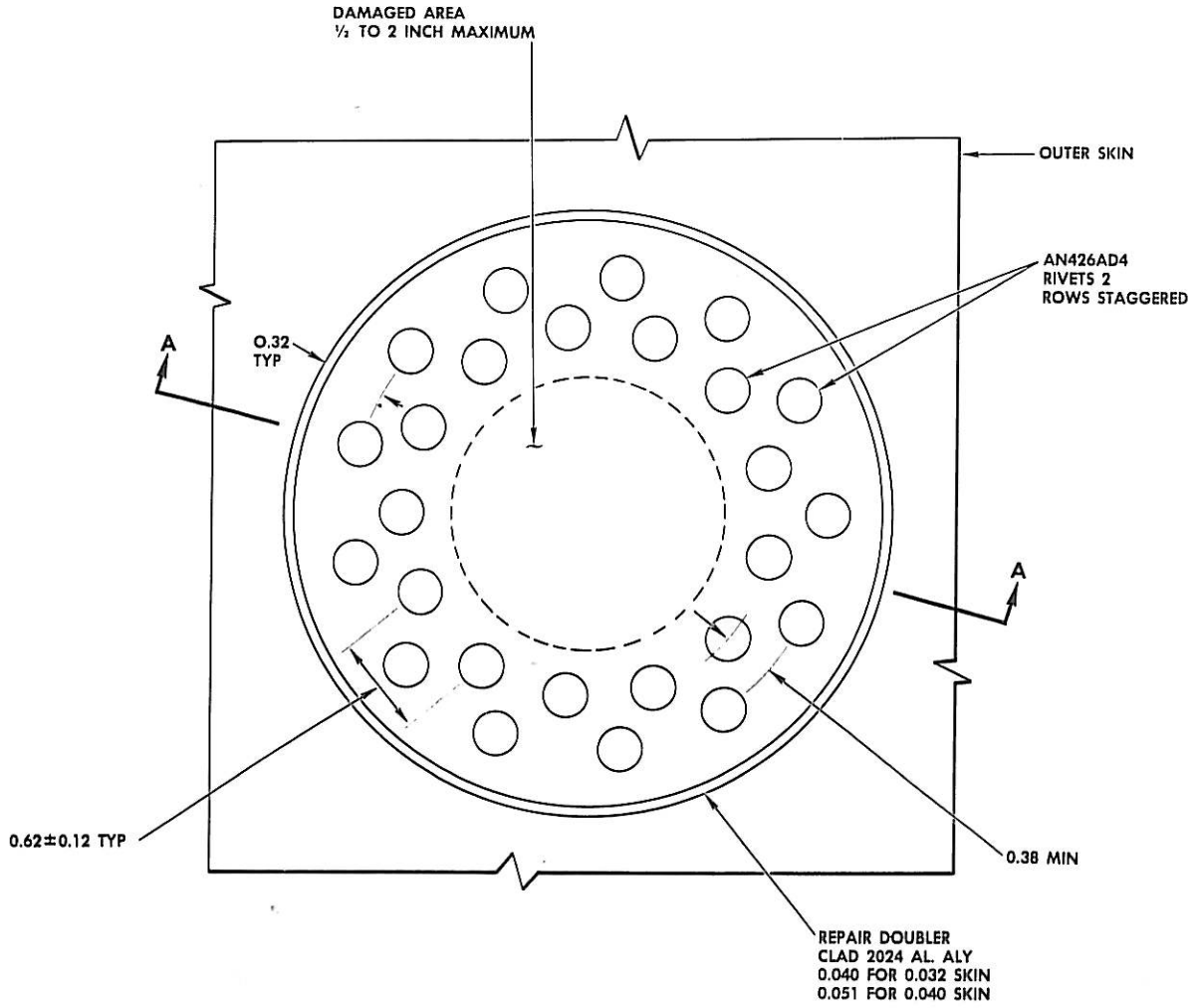
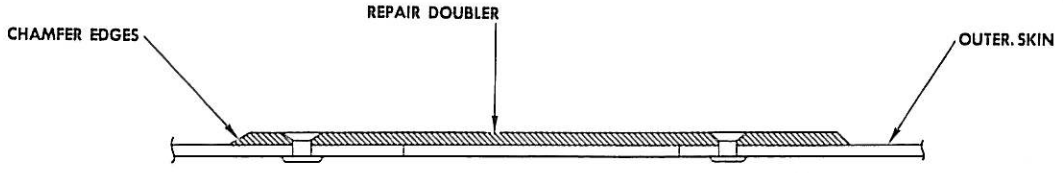


SECTION A-A

22.03.54.018





SECTION A-A

22.03.54.019

AERODYNAMIC SMOOTHNESS REQUIREMENTS - DESCRIPTION AND OPERATION

1. General

Jet airplanes are built to an aerodynamic form that minimizes parasitic drag. However, surface roughness or air leaks may develop in service to increase the airplane's total drag. Proper care taken in maintenance will avoid the drag build-up and eliminate the need for extra thrust to maintain operating speeds.

The total aerodynamic drag on the airplane stems from various causes. Induced drag is that retarding factor of aerodynamic force due to the production of lift by an aerodynamic surface, usually a wing. Parasitic drag is the retarding force on any part of the airplane that does not contribute useful lift. Pressure (or form) drag and skin friction produce most of the parasitic drag. Form drag increases markedly as the airplane approaches the speed of sound. This is called compressibility drag.

The thin wing, faired at body junctions, and the streamlining of the fuselage and nacelles contribute to the very low value of drag coefficient. This small coefficient of drag is necessary for efficient operation due to the relatively high speeds of jets, since total drag is proportional to velocity squared.

The jet airplane does not easily build up a drag increment. The wings, where contour smoothness is important, are built of stiffer members and heavier gage skin to minimize skin wrinkling. Normal care will assure the maintenance of high performance characteristics.

Pressurization seals are of primary importance. Entry and cargo door seals prevent the escape of high pressure air which would cause a drag by disturbing the air flow. Cargo compartments are pressurized as well as passenger cabins. The flushness of all doors and panels is important. The flushness of doors in pressurized areas may be checked while the airplane is partially pressurized on the ground.

Gouges, dents, or waves will cause deflection in the air stream and produce parasitic drag. Also, air streams passing across the depression at incompletely smoothed joints filled with fairing compound, create a low pressure area causing parasitic drag.

If aerodynamic cleaness is ignored during scheduled operation and maintenance, the total effect of drag increase may require added thrust and additional fuel consumption on the order of 1/2 pound of extra fuel per nautical air mile. Translated into airline operations; this means that on a particular flight segment of 2,500 miles, over half a ton of additional fuel must be carried.

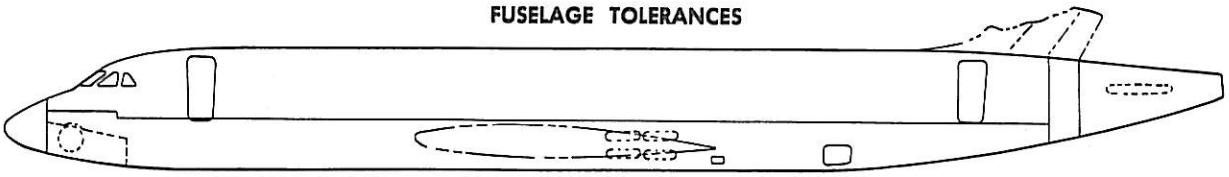
2. Standard Limits

When making repairs to the exterior surface of the airplane it is essential that the aerodynamic contour be maintained within certain limitations. For tolerances permissible for skin gaps, mismatch, and the protrusion of rivet heads, see Figure 1 through 6.

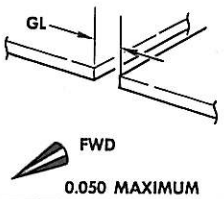
3. Application of Fairing Compound

Refer to 51-3-0 for fairing compound application procedures.

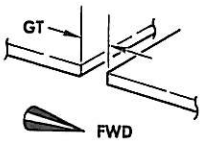
FUSELAGE TOLERANCES



DOORS, STRUCTURAL PANELS, AND SKIN BUTT JOINTS



0.050 MAXIMUM



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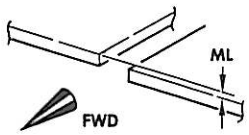
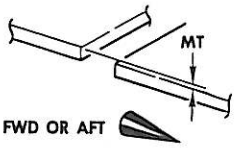


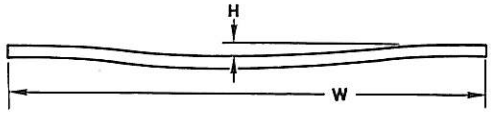
0.020 MAXIMUM



0.020 MAXIMUM

MAXIMUM RIVET (INCLUDING BLIND RIVETS) AND SCREW PROJECTION

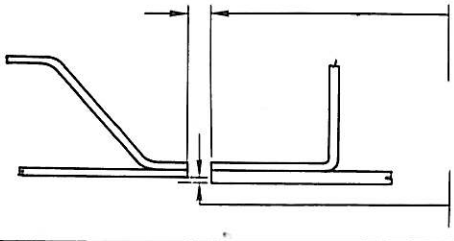
CONTOUR DEVIATIONS



H = 0.10 MAXIMUM (W OVER 20.0 INCHES)

H = 0.005 × W (W UNDER 20.0 INCHES)

GAPS AND MISMATCH BETWEEN DOORS, STRUCTURAL PANELS, AND ADJACENT STRUCTURE, EXCEPT NOSE LANDING GEAR DOOR MISMATCH.



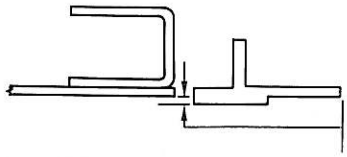
GL AND GT = 0.60 +0.000 −0.030 (EXCEPT MAIN LANDING GEAR, ENTRANCE, AND SERVICE DOORS)

GL AND GT = 0.060 ±0.030 (MAIN LANDING GEAR, ENTRANCE, AND SERVICE DOORS)

ML = 0.030 MAXIMUM (UNDER 8.2 PSI) CABIN PRESSURIZED

MT = 0.020 MAXIMUM (UNDER 8.2 PSI) CABIN PRESSURIZED

MISMATCH BETWEEN NOSE LANDING GEAR DOOR AND ADJACENT STRUCTURE.

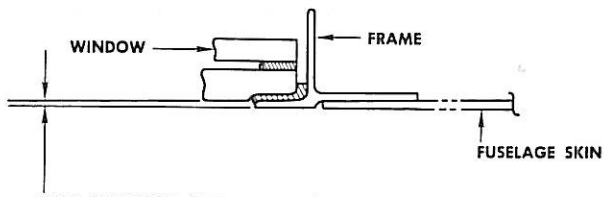


ML = FLUSH TO 0.060 BELOW CONTOUR

MT = ±0.020

GL = GAP LONGITUDINAL, GT = GAP TRANSVERSE, ML = MISMATCH LONGITUDINAL, MT = MISMATCH TRANSVERSE, PROJECTION FACING FORWARD OR AFT, H = HEIGHT, W = WAVELENGTH

MISMATCH BETWEEN WINDOW AND FRAME



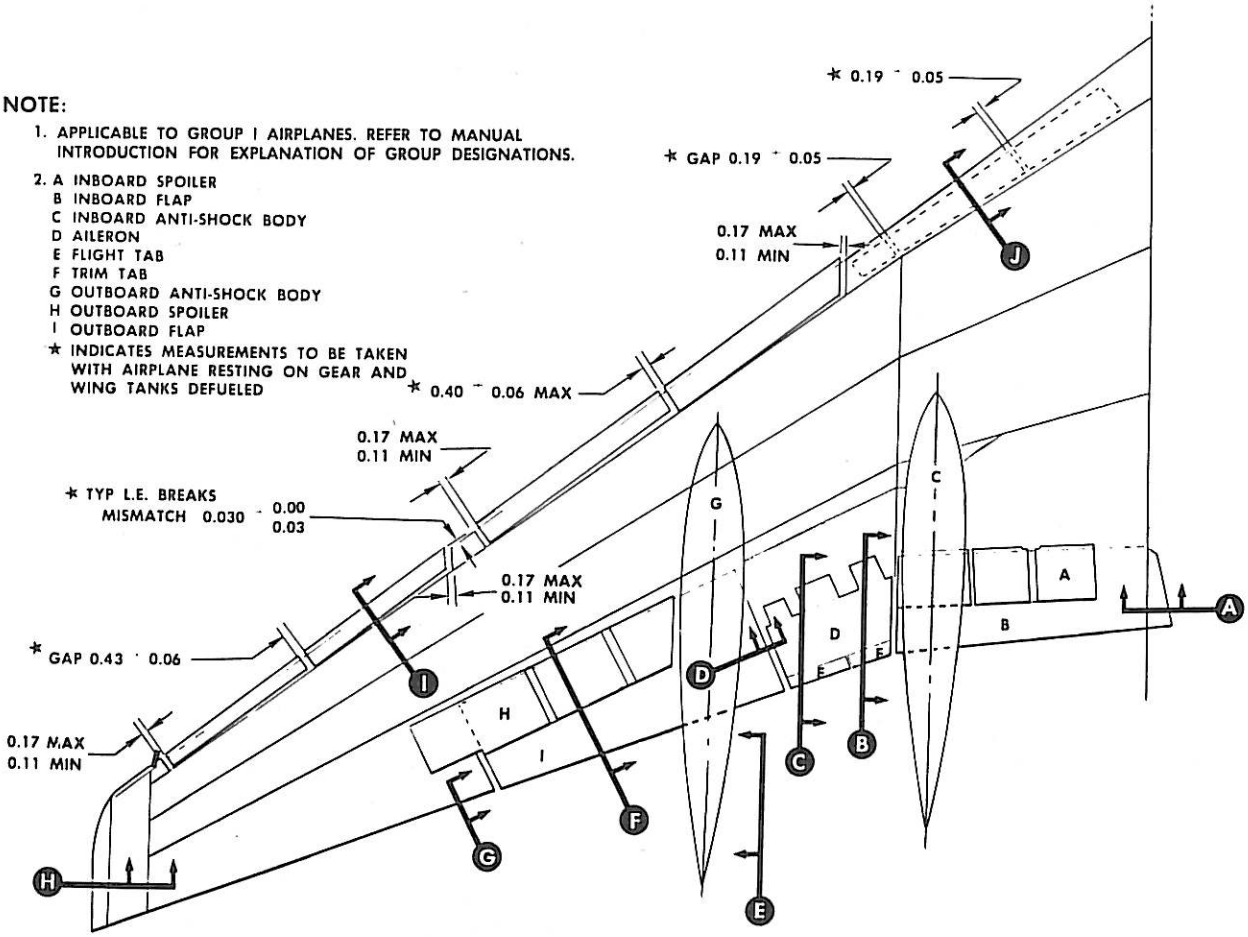
0.020 MAXIMUM (UNDER 8.2 PSI) CABIN PRESSURIZED FOR 50% OF CABIN WINDOWS.

0.040 MAXIMUM (UNDER 8.2 PSI) CABIN PRESSURIZED FOR REMAINDER OF CABIN WINDOWS.

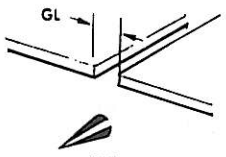
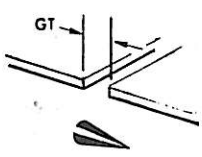
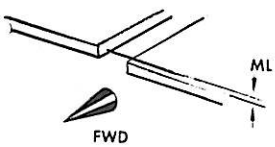
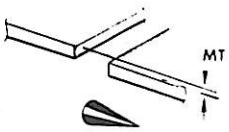
22.02.51.009-1C

NOTE:

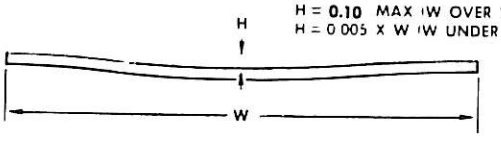
1. APPLICABLE TO GROUP I AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.
2. A INBOARD SPOILER
   B INBOARD FLAP
   C INBOARD ANTI-SHOCK BODY
   D AILERON
   E FLIGHT TAB
   F TRIM TAB
   G OUTBOARD ANTI-SHOCK BODY
   H OUTBOARD SPOILER
   I OUTBOARD FLAP
   * INDICATES MEASUREMENTS TO BE TAKEN WITH AIRPLANE RESTING ON GEAR AND WING TANKS DEFUELED



DOORS, STRUCTURAL PANELS, AND SKIN BUTT JOINTS

GL	GT	ML	MT
			
FWD	FWD	FWD	FWD OR AFT
0.025 MAX (FORWARD CL FRONT SPAR) 0.050 MAX (AFT CL FRONT SPAR) 0.040 MAX CENTER SPAR **0.050 MAX ANTI-SHOCK BODIES**	0.025 MAX (FORWARD CL FRONT SPAR) 0.050 MAX (AFT CL FRONT SPAR) 0.040 MAX CENTER SPAR **0.050 MAX ANTI-SHOCK BODY**	0.016 MAX (FORWARD CL FRONT SPAR) 0.018 MAX (FORWARD CL REAR SPAR AFT CL FRONT SPAR) 0.020 MAX (AFT CL REAR SPAR) **0.020 MAX ANTI-SHOCK BODIES**	0.016 MAX (FORWARD CL FRONT SPAR) 0.018 MAX (FORWARD CL REAR SPAR AFT CL FRONT SPAR) 0.020 MAX (AFT CL REAR SPAR) **0.020 MAX ANTI-SHOCK BODIES**

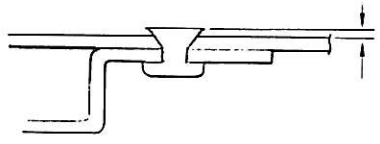
CONTOUR DEVIATIONS



H = **0.10** MAX (W OVER 20.0 INCHES)
H = 0.005 X W (W UNDER 20.0 INCHES)

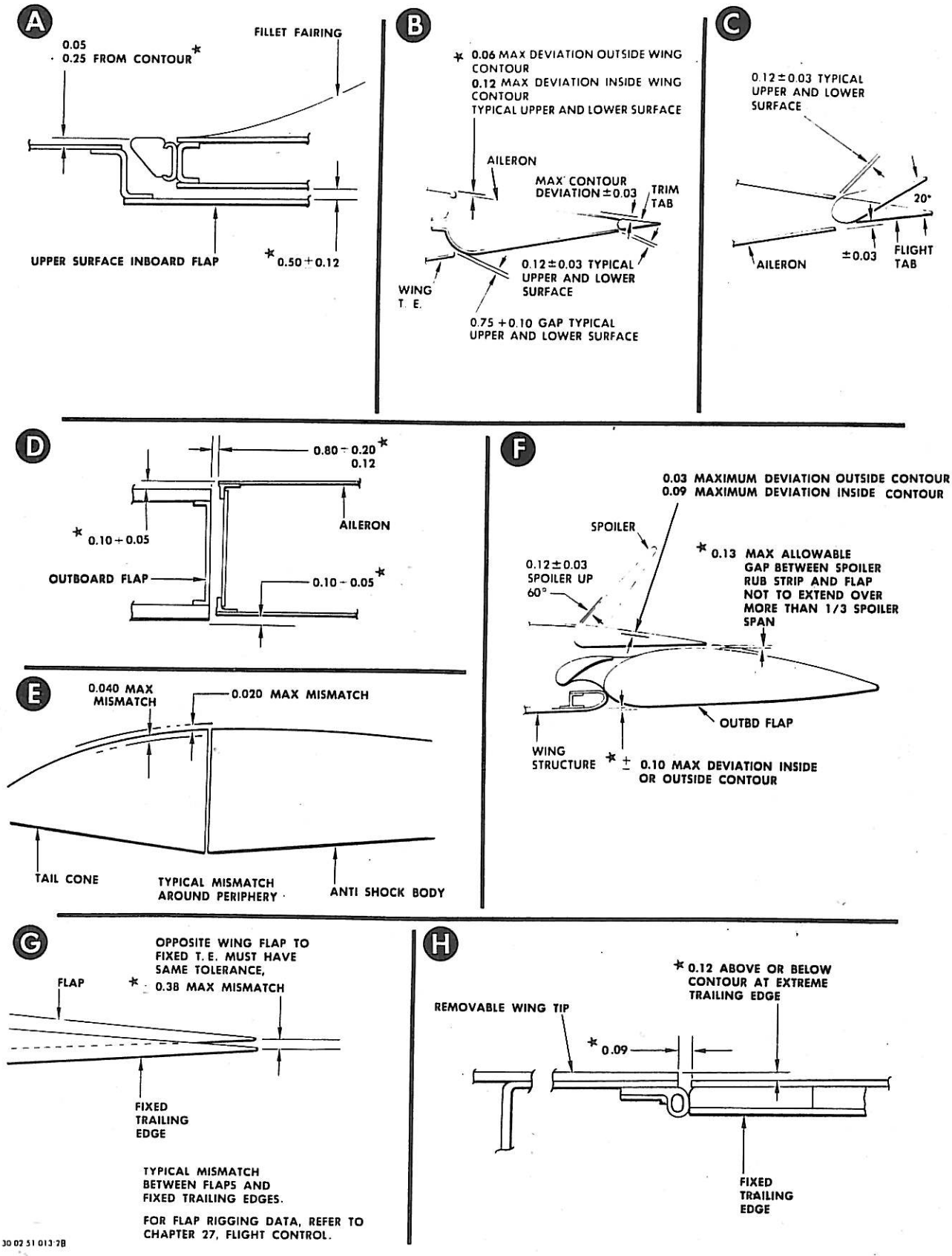
GL = GAP LONGITUDINAL GT = GAP TRANSVERSE ML = MISMATCH LONGITUDINAL
MT = MISMATCH TRANSVERSE PROJECTION FACING FORWARD OR AFT
H = HEIGHT W = WAVELENGTH

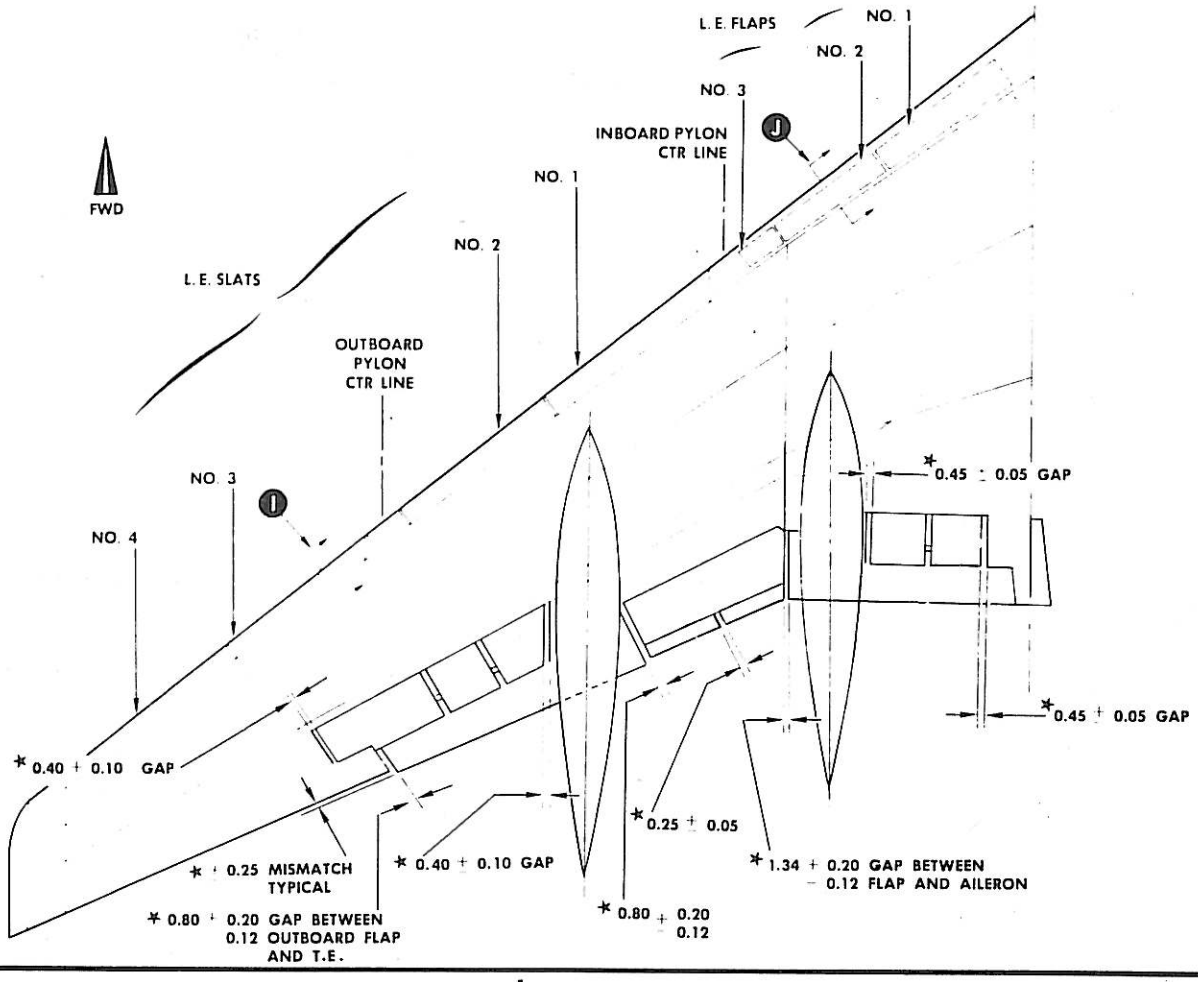
MAXIMUM RIVET (INCLUDING BLIND RIVETS) AND SCREW PROJECTION

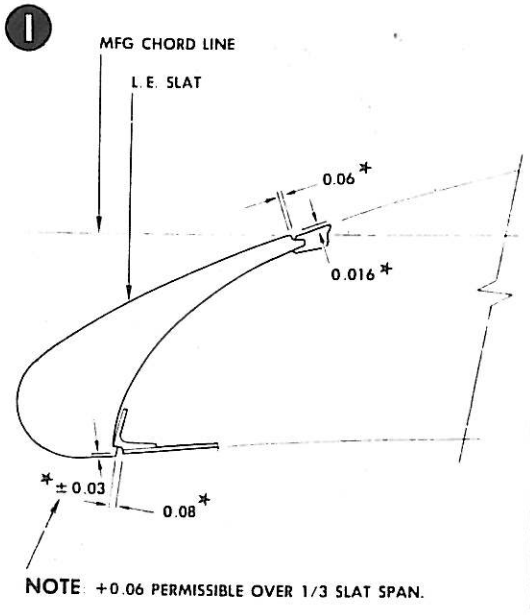


0.006 MAX ABOVE SKIN SURFACE (FWD OF AND INCLUDING REAR SPAR)
0.007 MAX ABOVE SKIN SURFACE (AFT OF REAR SPAR)

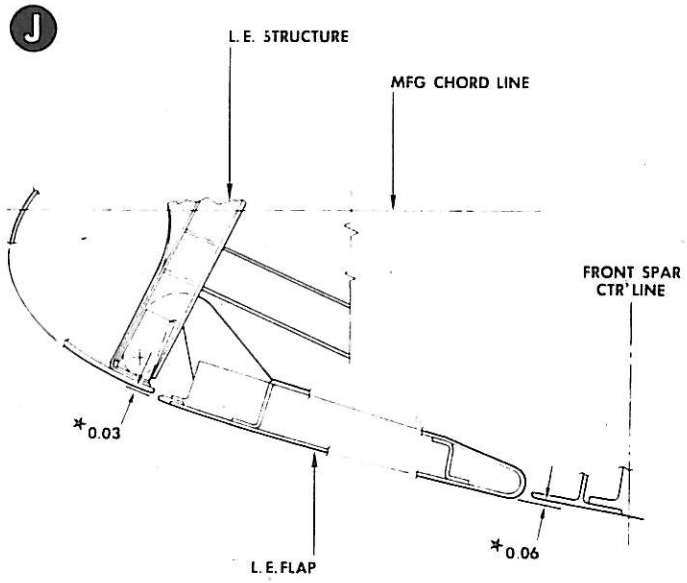
30 02 51 013-1B


A
0.05
0.25 FROM CONTOUR *
FILLET FAIRING
UPPER SURFACE INBOARD FLAP
* 0.50 + 0.12
B
* 0.06 MAX DEVIATION OUTSIDE WING CONTOUR
0.12 MAX DEVIATION INSIDE WING CONTOUR
TYPICAL UPPER AND LOWER SURFACE
AILERON
MAX CONTOUR DEVIATION ± 0.03
TRIM TAB
0.12 ± 0.03 TYPICAL UPPER AND LOWER SURFACE
WING T. E.
0.75 + 0.10 GAP TYPICAL UPPER AND LOWER SURFACE
C
0.12 ± 0.03 TYPICAL UPPER AND LOWER SURFACE
20°
AILERON
± 0.03
FLIGHT TAB
D
0.80 ± 0.20 *
0.12
AILERON
* 0.10 + 0.05
OUTBOARD FLAP
0.10 - 0.05 *
E
0.040 MAX MISMATCH
0.020 MAX MISMATCH
TAIL CONE
TYPICAL MISMATCH AROUND PERIPHERY
ANTI SHOCK BODY
F
0.03 MAXIMUM DEVIATION OUTSIDE CONTOUR
0.09 MAXIMUM DEVIATION INSIDE CONTOUR
SPOILER
* 0.13 MAX ALLOWABLE GAP BETWEEN SPOILER RUB STRIP AND FLAP NOT TO EXTEND OVER MORE THAN 1/3 SPOILER SPAN
0.12 ± 0.03 SPOILER UP 60°
OUTBD FLAP
WING STRUCTURE
* ± 0.10 MAX DEVIATION INSIDE OR OUTSIDE CONTOUR
G
OPPOSITE WING FLAP TO FIXED T. E. MUST HAVE SAME TOLERANCE,
FLAP
* 0.38 MAX MISMATCH
FIXED TRAILING EDGE
TYPICAL MISMATCH BETWEEN FLAPS AND FIXED TRAILING EDGES.
FOR FLAP RIGGING DATA, REFER TO CHAPTER 27, FLIGHT CONTROL.
H
* 0.12 ABOVE OR BELOW CONTOUR AT EXTREME TRAILING EDGE
REMOVABLE WING TIP
* 0.09
FIXED TRAILING EDGE
30 02 51 013 2B





TYPICAL FOR SLATS



TYPICAL FOR LEADING EDGE FLAPS

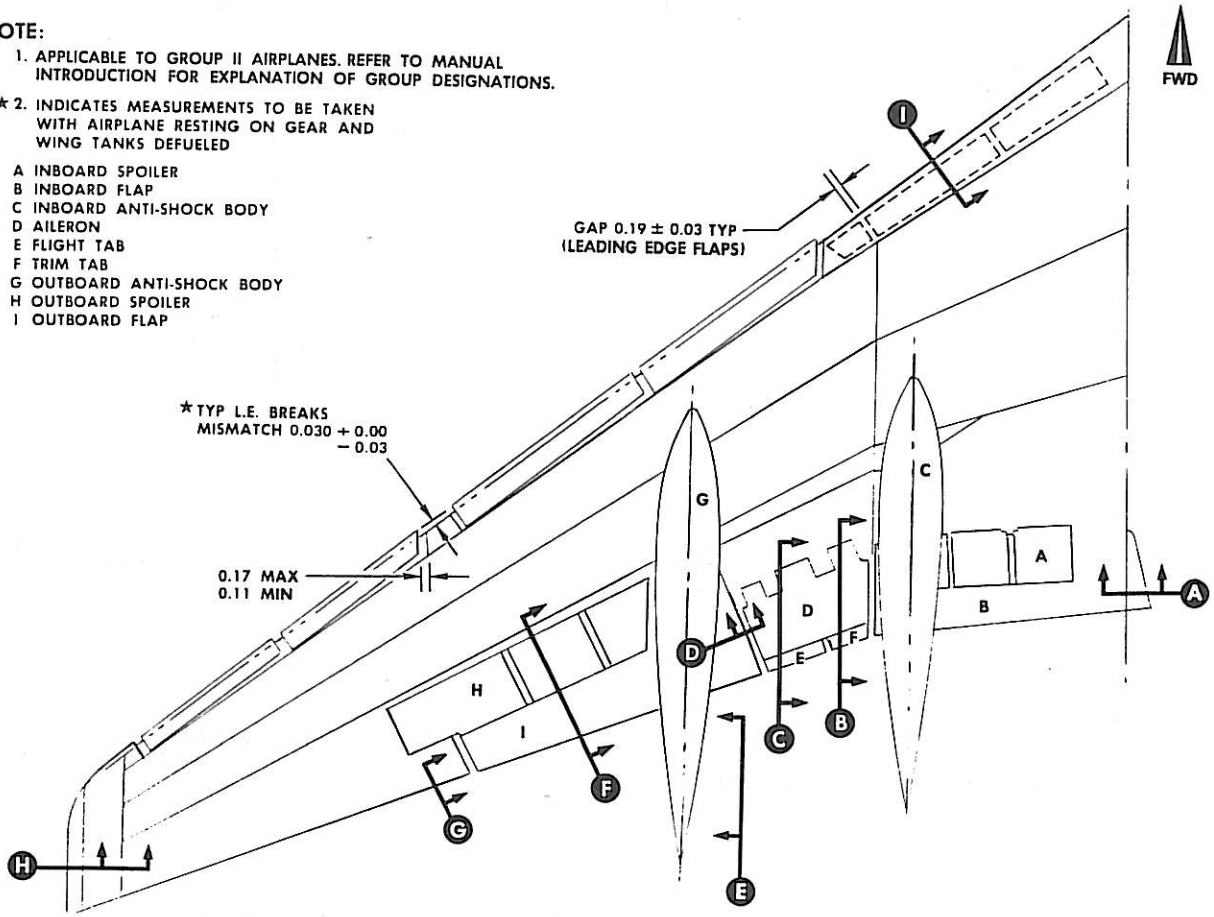
30 02 51 013-3

Aerodynamic Smoothness Requirements, Wing
Figure 2 (Sheet 3 of 3)

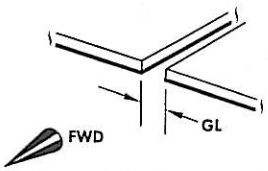
NOTE:

1. APPLICABLE TO GROUP II AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.
2. ★ INDICATES MEASUREMENTS TO BE TAKEN WITH AIRPLANE RESTING ON GEAR AND WING TANKS DEFUELED

A INBOARD SPOILER
B INBOARD FLAP
C INBOARD ANTI-SHOCK BODY
D AILERON
E FLIGHT TAB
F TRIM TAB
G OUTBOARD ANTI-SHOCK BODY
H OUTBOARD SPOILER
I OUTBOARD FLAP



DOORS, STRUCTURAL PANELS, AND SKIN BUTT JOINTS

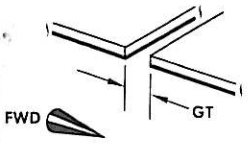


0.025 MAX (FORWARD CL FRONT SPAR)

0.050 MAX (AFT CL FRONT SPAR)

0.040 MAX CENTER SPAR

0.050 MAX ANTI-SHOCK BODIES

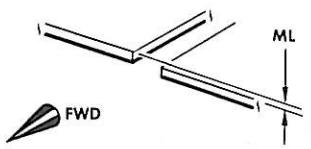


0.025 MAX (FORWARD CL FRONT SPAR)

0.050 MAX (AFT CL FRONT SPAR)

0.040 MAX CENTER SPAR

0.050 MAX ANTI-SHOCK BODY

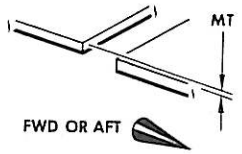


0.016 MAX (FORWARD CL FRONT SPAR)

0.018 MAX (FORWARD CL REAR SPAR AFT CL FRONT SPAR)

0.020 MAX (AFT CL REAR SPAR)

0.020 MAX ANTI-SHOCK BODIES



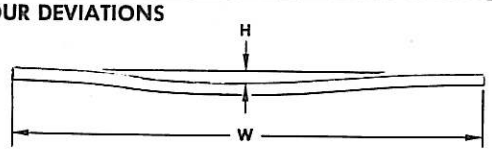
0.016 MAX (FORWARD CL FRONT SPAR)

0.018 MAX (FORWARD CL REAR SPAR AFT FRONT SPAR)

0.020 MAX (AFT CL REAR SPAR)

0.020 MAX ANTI-SHOCK BODIES

CONTOUR DEVIATIONS

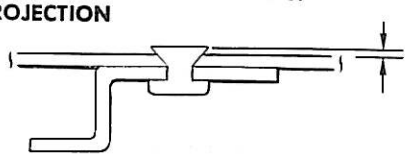


H = HEIGHT
W = WAVELENGTH
GT = GAP TRANSVERSE
GL = GAP LONGITUDINAL
ML = MISMATCH LONGITUDINAL
MT = MISMATCH TRANSVERSE PROJECTION FACING FORWARD OR AFT

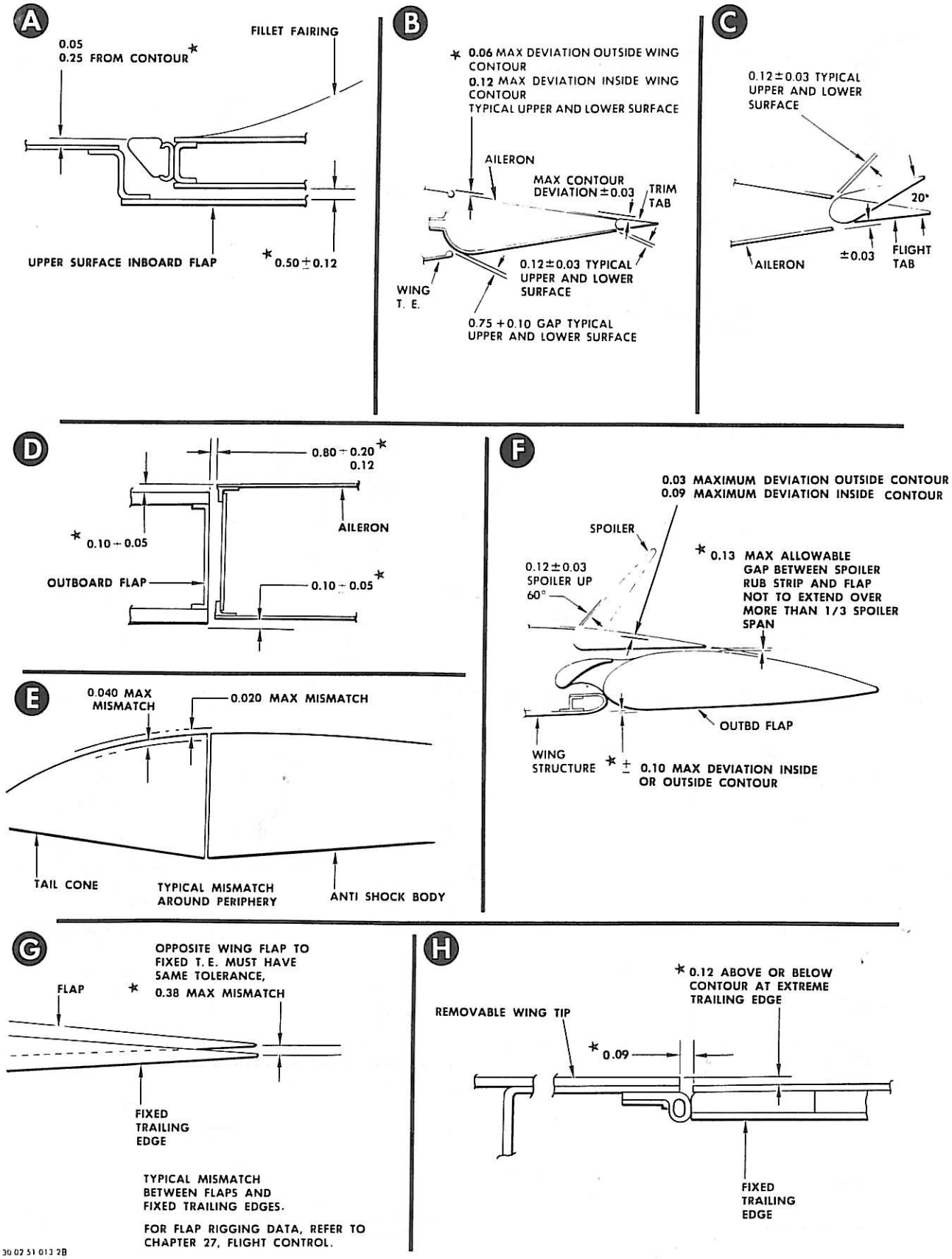
H = 0.10 MAX (W OVER 20.0 INCHES)
H = 0.005 X W (W UNDER 20.0 INCHES)

30.02.51.019

MAXIMUM RIVET (INCLUDING BLIND RIVETS) AND SCREW PROJECTION

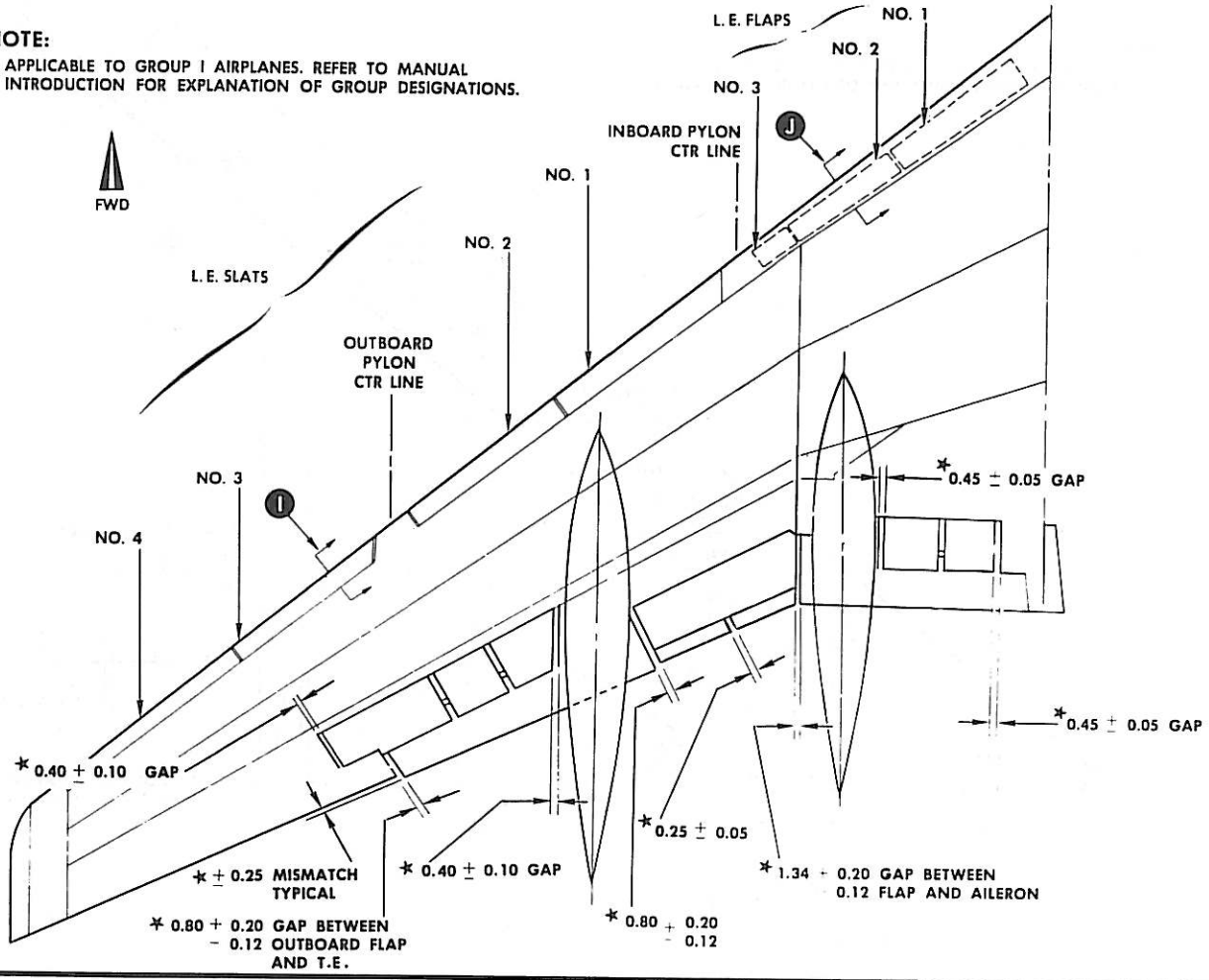


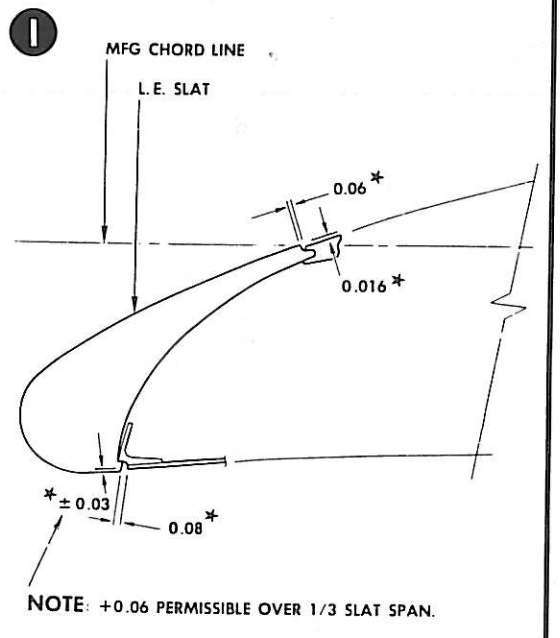
0.006 MAX ABOVE SKIN SURFACE (FWD OF AND INCLUDING REAR SPAR)
0.007 MAX ABOVE SKIN SURFACE (AFT OF REAR SPAR)



Aerodynamic Smoothness Requirements, Wing
Figure 2 (Sheet 3 of 5)

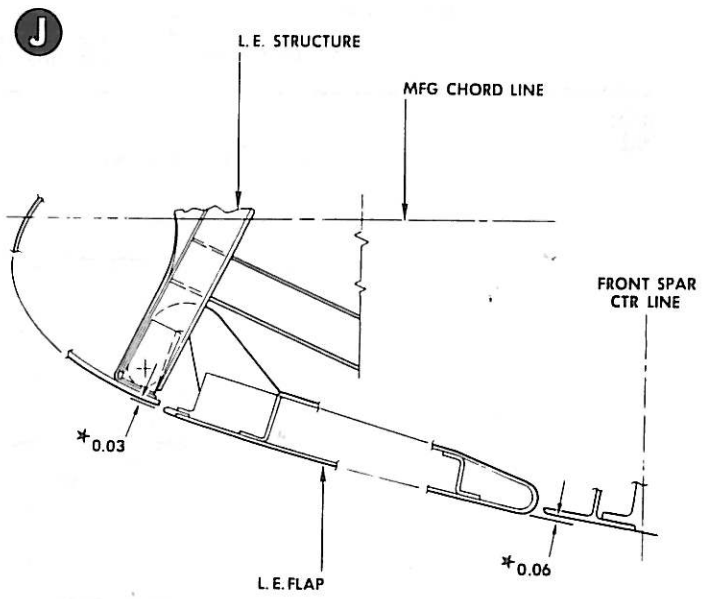
NOTE:
APPLICABLE TO GROUP I AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.





NOTE: +0.06 PERMISSIBLE OVER 1/3 SLAT SPAN.

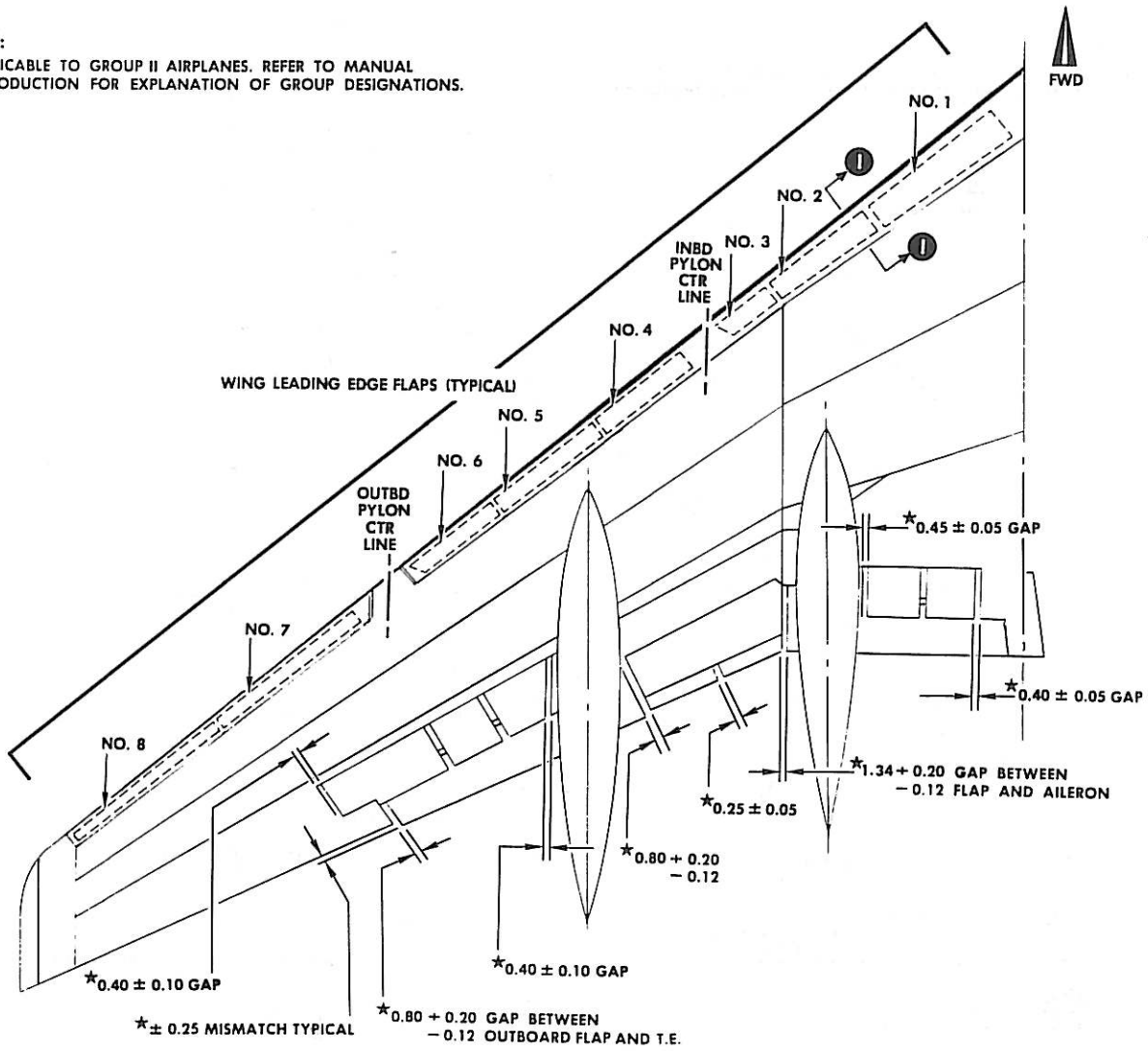
TYPICAL FOR SLATS



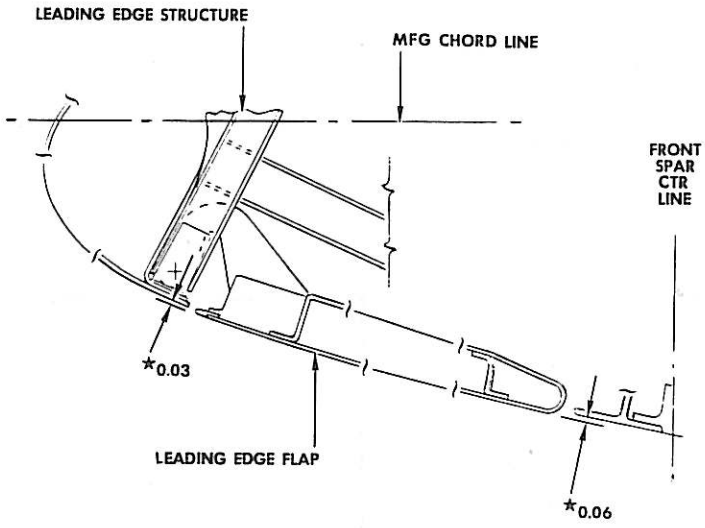
TYPICAL FOR LEADING EDGE FLAPS

30 02 51 013-3A

NOTE:
APPLICABLE TO GROUP II AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.

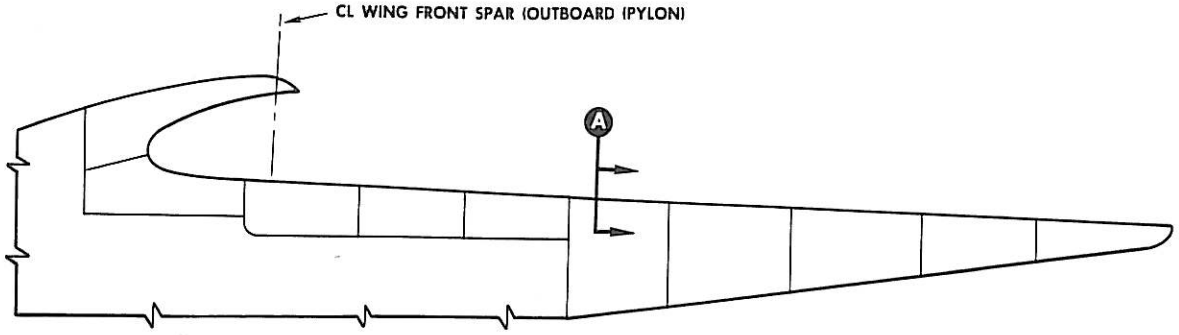


(1)



30 02 51.018

TYPICAL FOR LEADING EDGE FLAPS

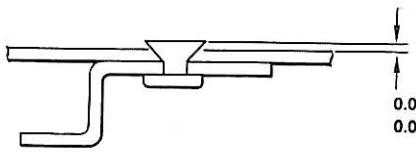


NACELLE PYLON

DOORS, STRUCTURAL PANELS, AND SKIN BUTT JOINTS.

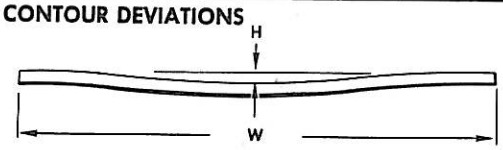
GL / FWD	GT / FWD	ML / FWD	MT / FWD OR AFT
+0.00 0.035 −0.015 MAXIMUM (FORWARD CL WING FRONT SPAR) +0.00 0.040 −0.015 MAXIMUM (AFT CL WING FRONT SPAR)	+0.00 0.035 −0.015 MAXIMUM (FORWARD CL WING FRONT SPAR) +0.00 0.040 −0.015 MAXIMUM (AFT CL WING FRONT SPAR)	0.016 MAXIMUM (FORWARD CL WING FRONT SPAR) 0.020 MAXIMUM (AFT CL WING FRONT SPAR)	0.016 MAXIMUM (FORWARD CL WING FRONT SPAR) 0.020 MAXIMUM (AFT CL WING FRONT SPAR)

MAXIMUM RIVET (INCLUDING BLIND RIVETS) AND SCREW PROJECTION.



0.006 MAXIMUM ABOVE SKIN SURFACE (FORWARD CL FRONT SPAR)
0.007 MAXIMUM ABOVE SKIN SURFACE (AFT CL FRONT SPAR)

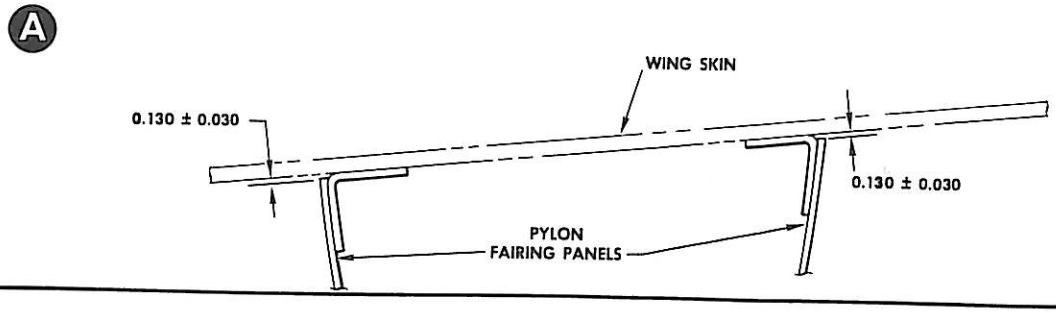
CONTOUR DEVIATIONS



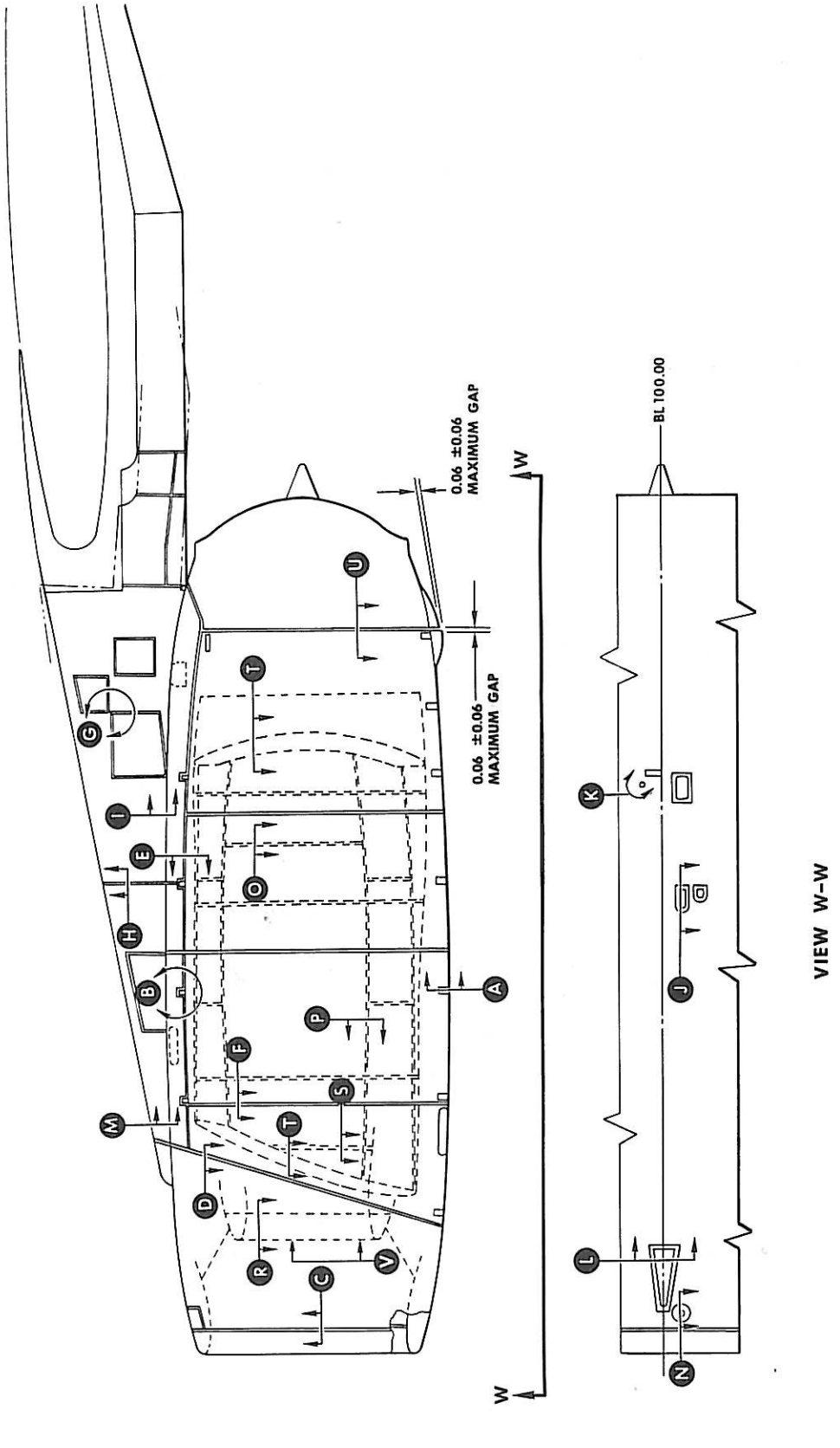
H=0.10 MAXIMUM (W OVER 20.0 INCHES)
H=0.005×W (W UNDER 20.0 INCHES)

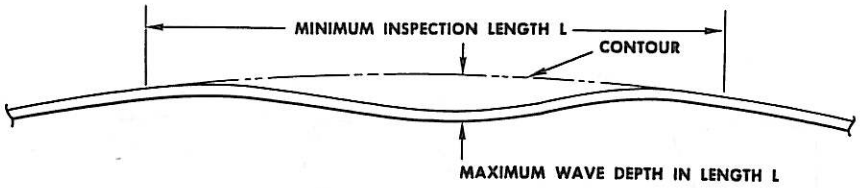
GL=GAP LONGITUDINAL, GT=GAP TRANSVERSE, ML=MISMATCH LONGITUDINAL,
MT=MISMATCH TRANSVERSE, PROJECTION FACING FORWARD OR AFT,

GAP BETWEEN FAIRING PANELS AND WING SKIN.



30.02.51.010 B

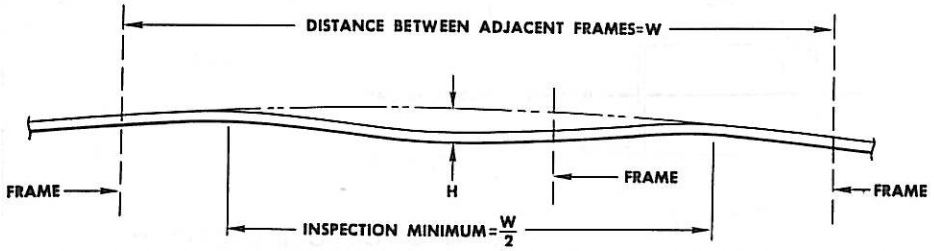

0.06 ±0.06
MAXIMUM GAP
0.06 ±0.06
MAXIMUM GAP
W
W
BL 100.00
VIEW W-W
30.02.51.012-1A



NOTES:

1. 0.100 FOR ALL EXTERIOR SURFACES (L=20.0 INCHES).
   0.100 FOR ALL INTERIOR SURFACES (L=10.0 INCHES).
   0.030 FOR COMMON INLET LIP TO PLANE OF INLET MINIMUM AREA (L=6.0 INCHES).
   0.050 FOR PRIMARY LIP TO PLANE OF PRIMARY INLET MINIMUM AREA (L=10.0 INCHES).
2. WAVE LENGTH MAY BE ANY LENGTH OVER 10.0 INCHES PROVIDING DEPTH DOES NOT EXCEED WAVE DEPTHS NOTED ABOVE.

SKIN SMOOTHNESS MAXIMUM WAVE DEPTHS POD/PYLON FORWARD CLEAVAGE (TYPICAL)

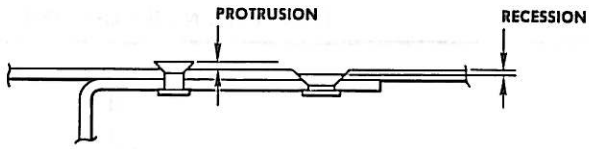


NOTES:

1. PERMISSIBLE NUMBER OF WAVES SHOULD BE KEPT TO AN ABSOLUTE MINIMUM PER THE FOLLOWING:
   a. MAXIMUM WAVINESS $=\frac{2H}{W}=$ 0.005 INCH OF CREST TO CREST DISTANCE-TYPICAL FOR ALL EXTERIOR SURFACES FORWARD OF CLEAVAGE

   b. MAXIMUM WAVINESS $=\frac{2H}{W}=$ 0.010 INCH OF CREST TO CREST DISTANCE-TYPICAL FOR ALL INTERIOR SURFACES FORWARD OF CLEAVAGE

SKIN SMOOTHNESS MAXIMUM WAVINESS POD/PYLON FORWARD CLEAVAGE (TYPICAL)



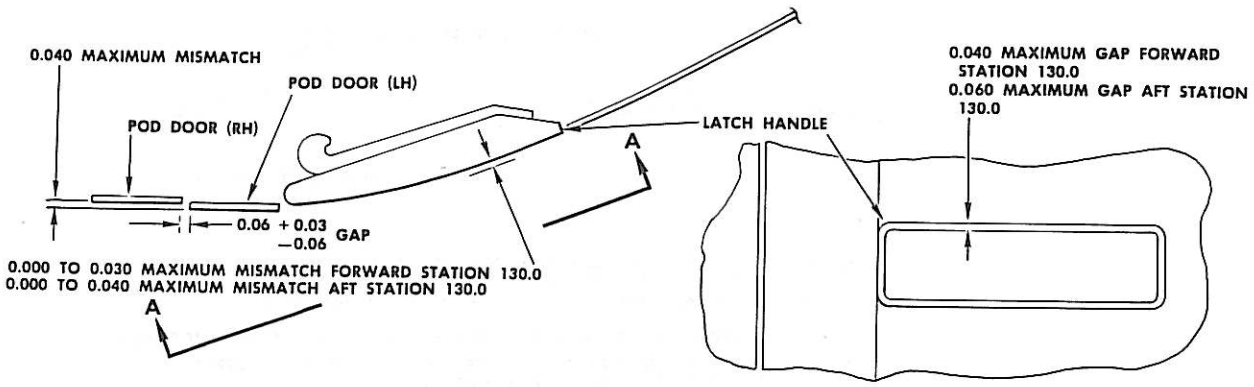
NOTES:

1. 0.005 FOR ALL INTERIOR SURFACES
2. 0.005 FOR ALL EXTERIOR SURFACES FORWARD STATION 130.0
3. 0.007 FOR ALL EXTERIOR SURFACES AFT STATION 130.0
4. MAXIMUM FASTENER PROTRUSION AND RECESSION (TYPICAL—FORWARD CLEAVAGE)
   a. 0.006 FORWARD 30%
   b. 0.007 AFT 70%
5. RIVET PROTRUSIONS 0.010 OR GREATER MAY BE MILLED 0.007 INCH (TYPICAL ALL SURFACES)

MAXIMUM FASTENER PROTRUSION AND RECESSION (TYPICAL FOR POD)

30.02.51.012-2

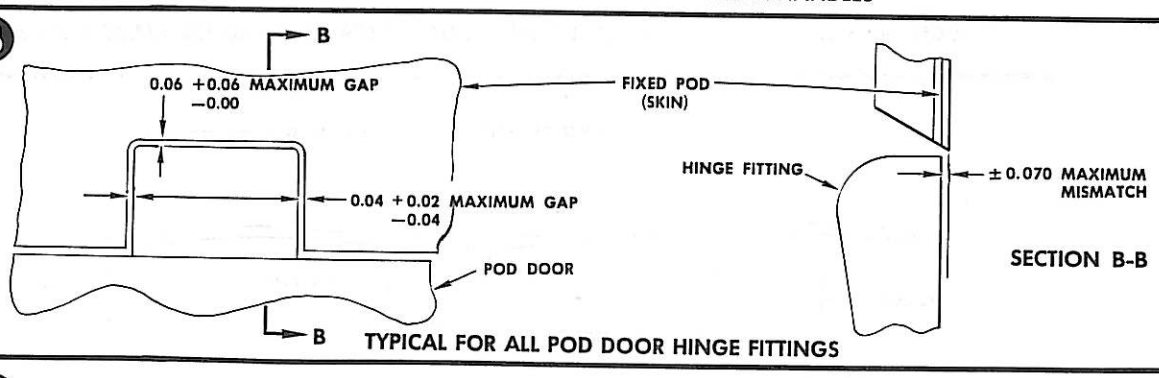
A



TYPICAL ALL SHEAR AND TENSION LATCH HANDLES

VIEW A-A

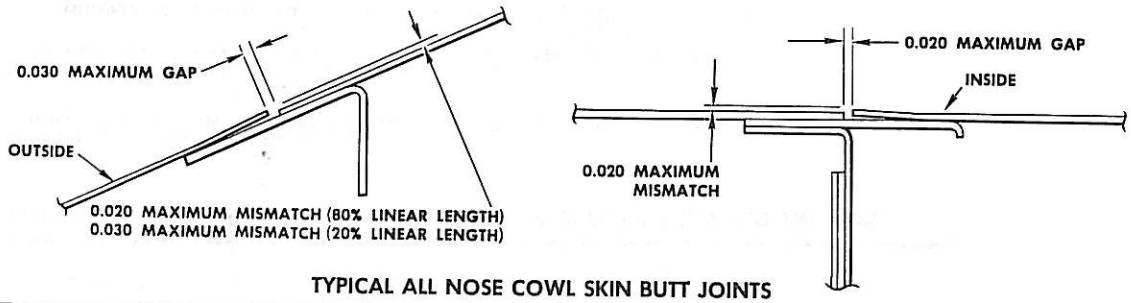
B



TYPICAL FOR ALL POD DOOR HINGE FITTINGS

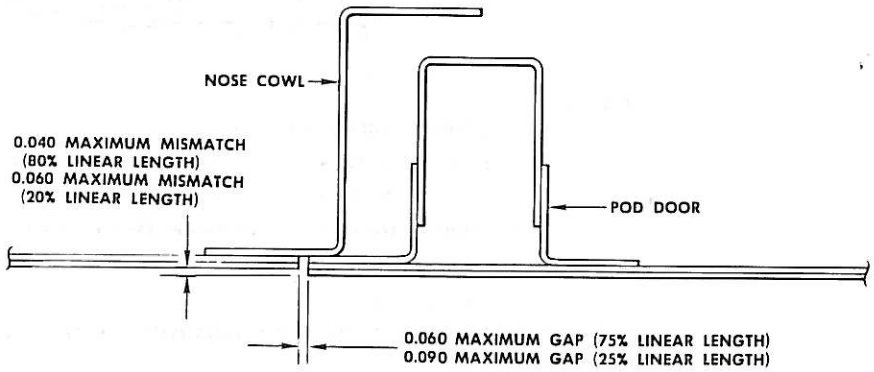
SECTION B-B

C



TYPICAL ALL NOSE COWL SKIN BUTT JOINTS

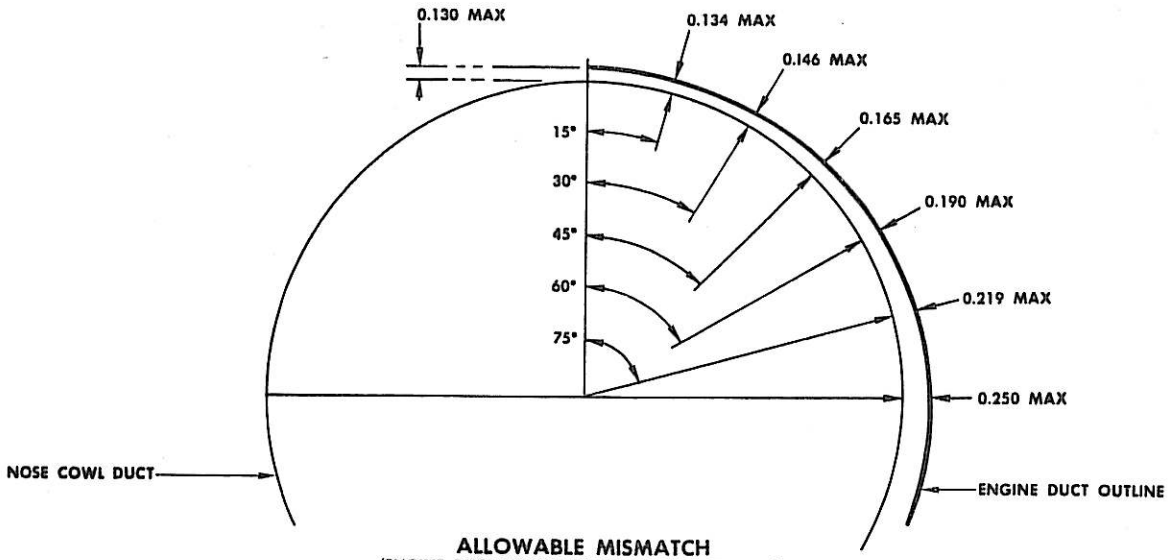
D



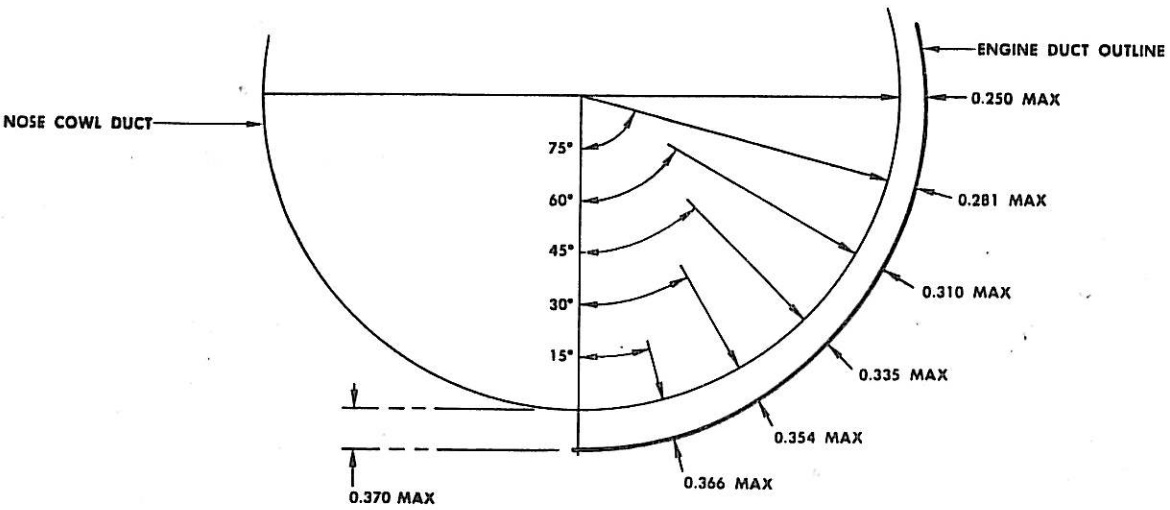
NOSE COWL—POD DOOR INTERSECTION

30.02.51.012-3

(V)



ALLOWABLE MISMATCH
(ENGINE DUCT HIGHER THAN NOSE COWL DUCT)

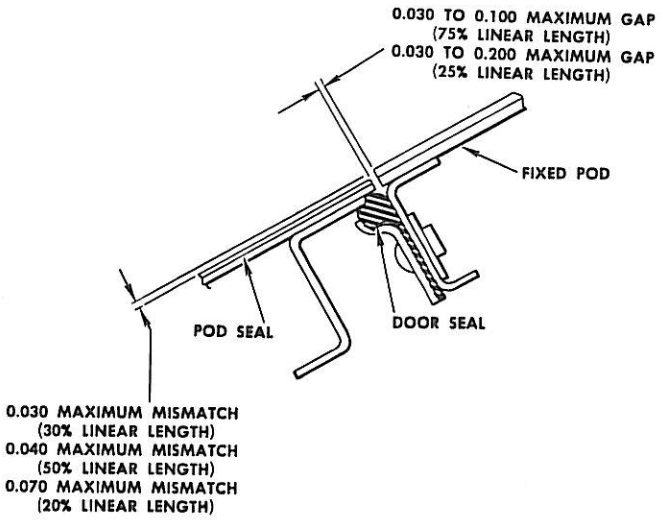


ALLOWABLE MISMATCH
(ENGINE DUCT LOWER THAN NOSE COWL DUCT)

30.02.51.012-8

E

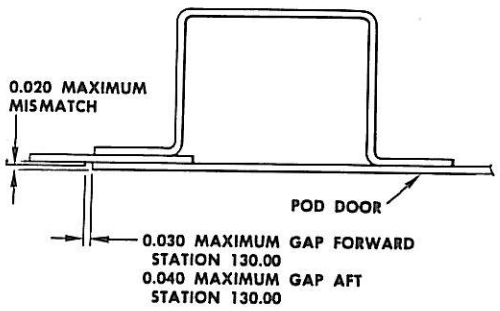
TYPICAL POD DOOR SEAL



VIEW LOOKING FORWARD

F

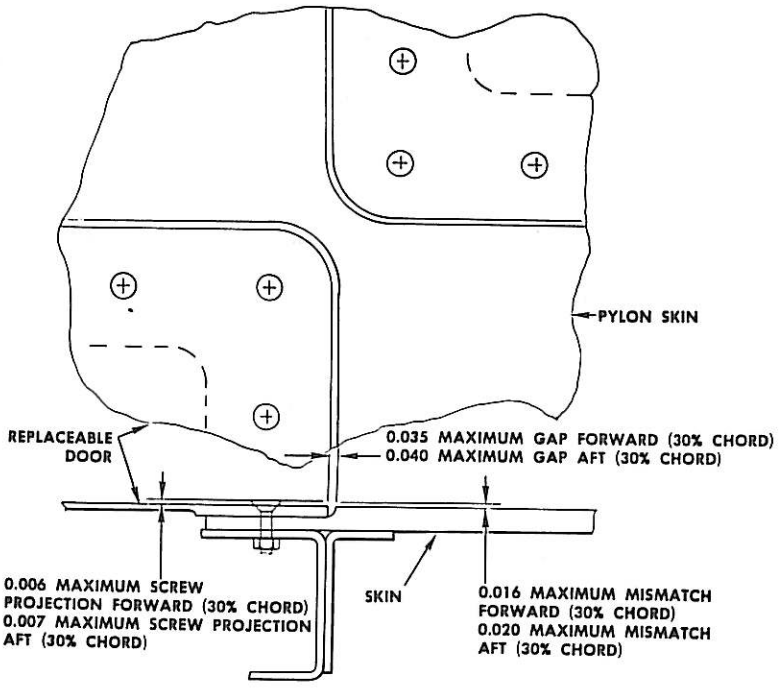
TYPICAL ALL POD DOOR SKIN BUTT JOINTS



VIEW LOOKING DOWN

G

TYPICAL ALL PYLON DOORS

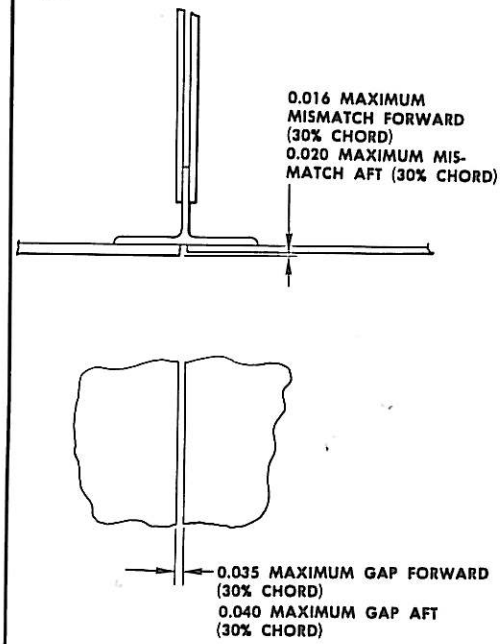


VIEW LOOKING DOWN

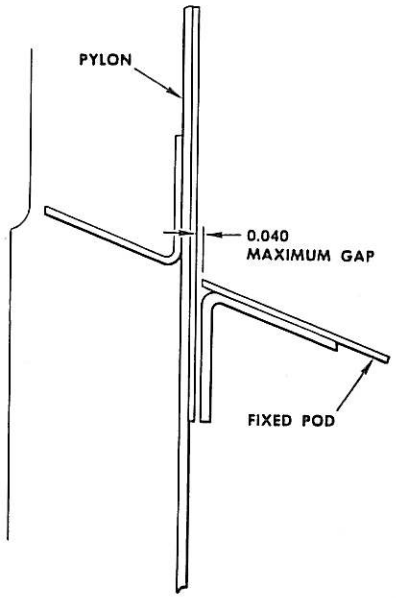
30.02.51.012-4 A

H

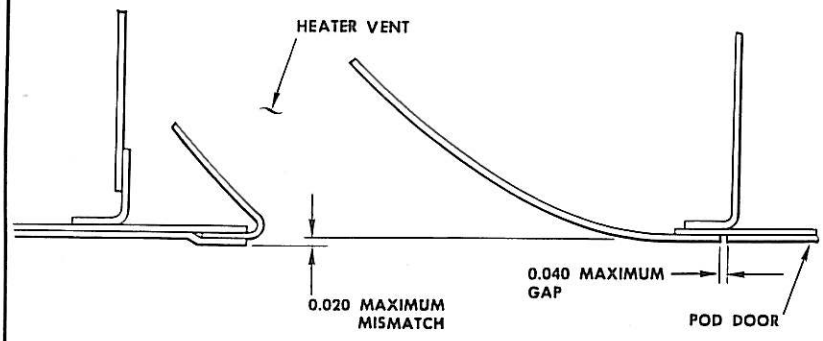
TYPICAL PYLON SKIN BUTT JOINTS



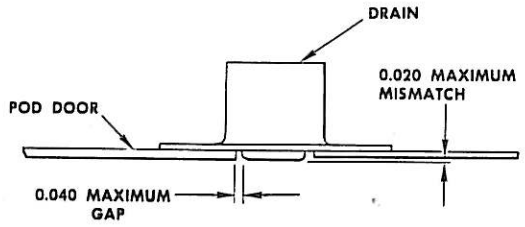
I TYPICAL POD-PYLON INTERSECTION AFT



J TYPICAL FOR HEATER VENT-SUMP VENT-COOLING POD DOOR EJECTOR DUCT OPENING



K POD DOOR DRAIN OPENING



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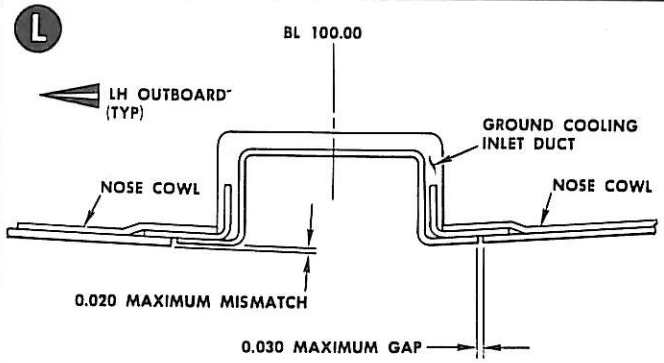
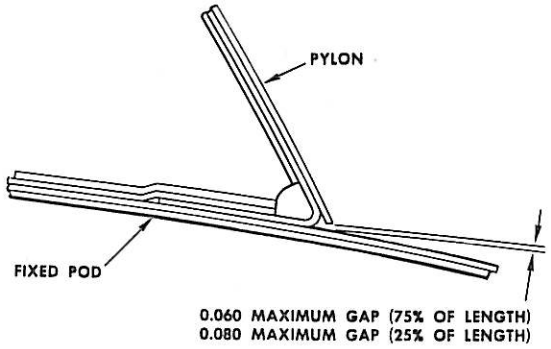


M TYPICAL POD-PYLON INTERSECTION FORWARD



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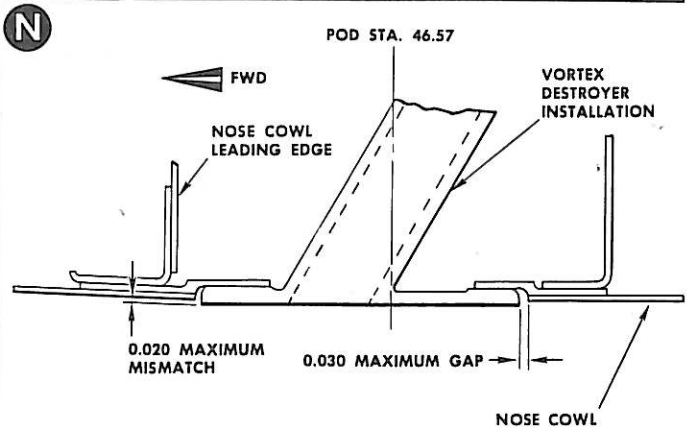
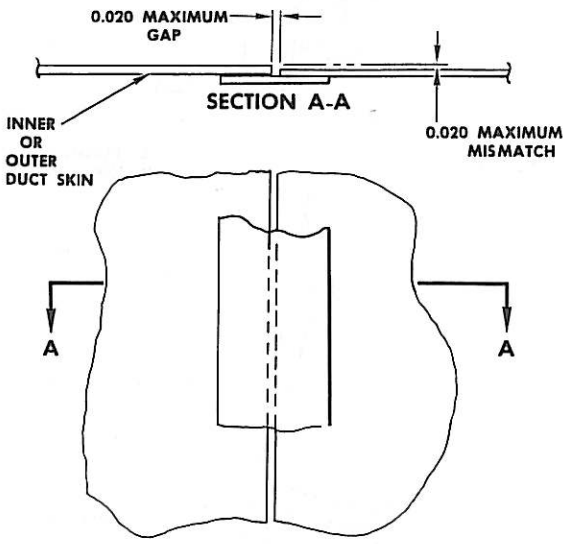
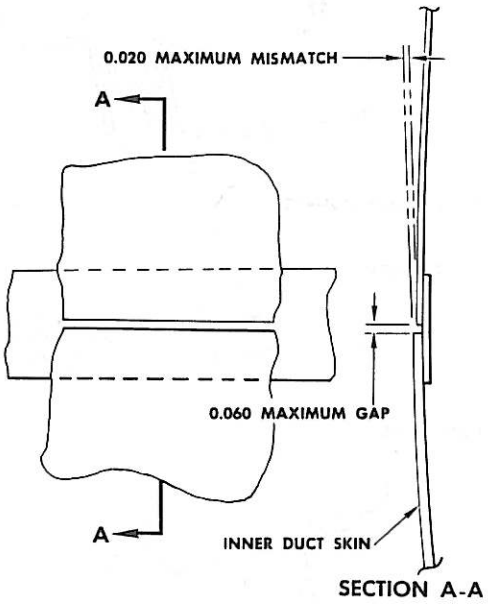


30.02.51.012-5

O TYPICAL FAN DUCT INNER AND OUTER SKIN JOINT



P TYPICAL FAN DUCT INNER SKIN JOINT (AXIAL)



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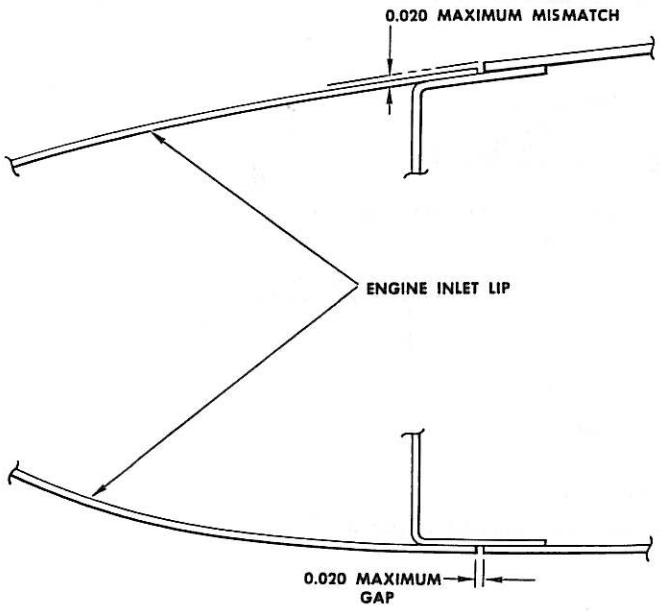
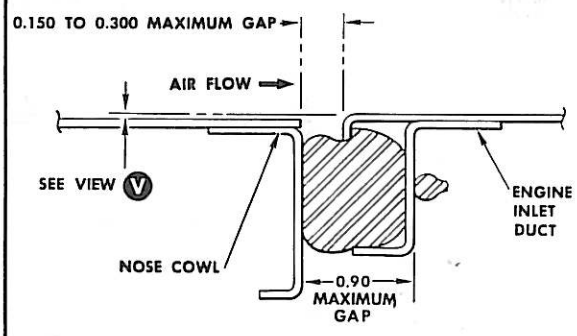
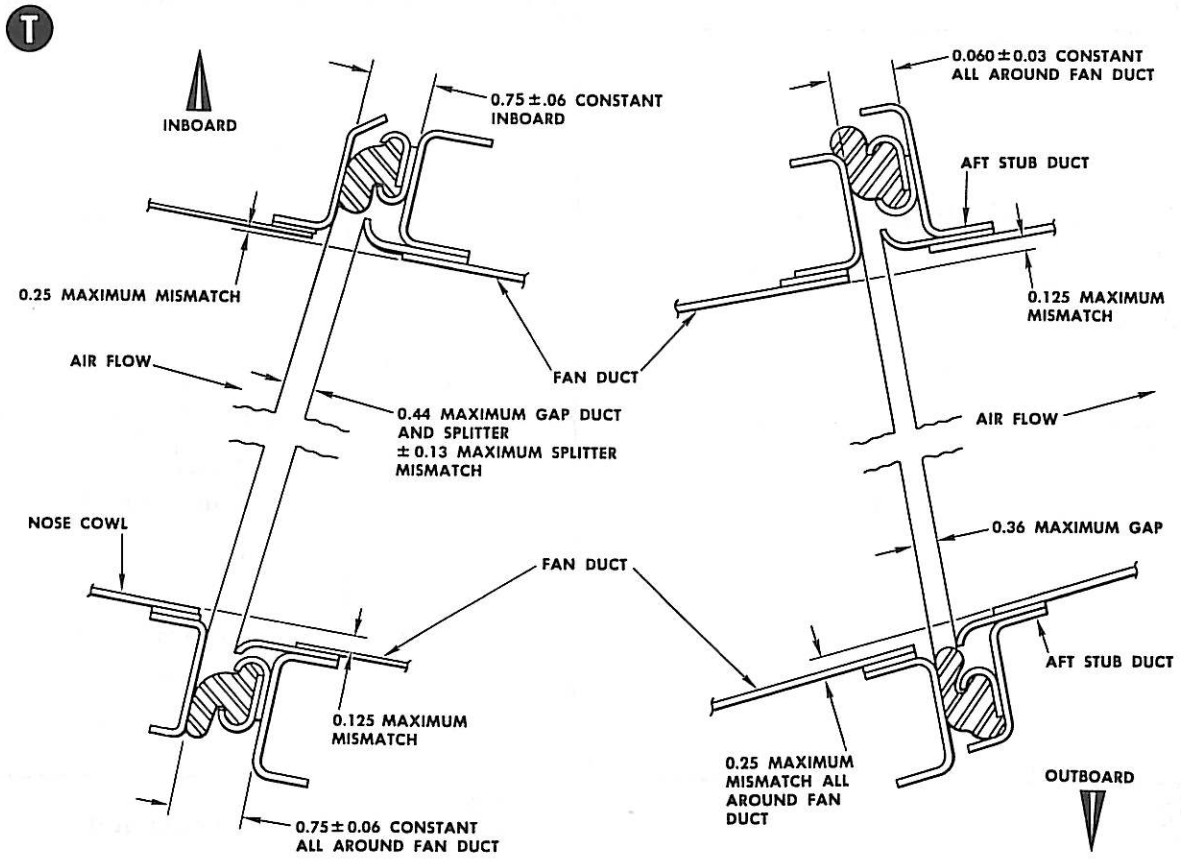


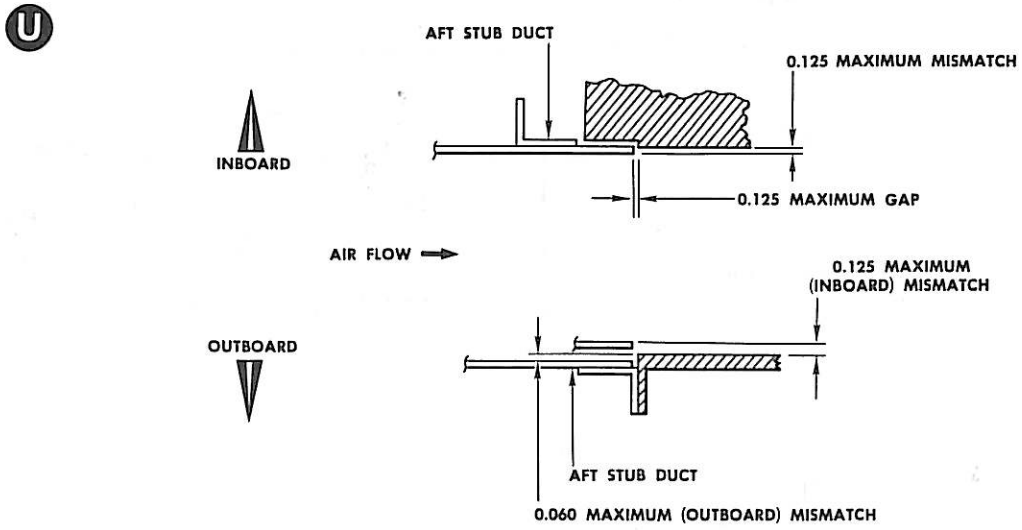
S ENGINE INLET DUCT SEAL



VIEW LOOKING DOWN

30.02.51.012-6A

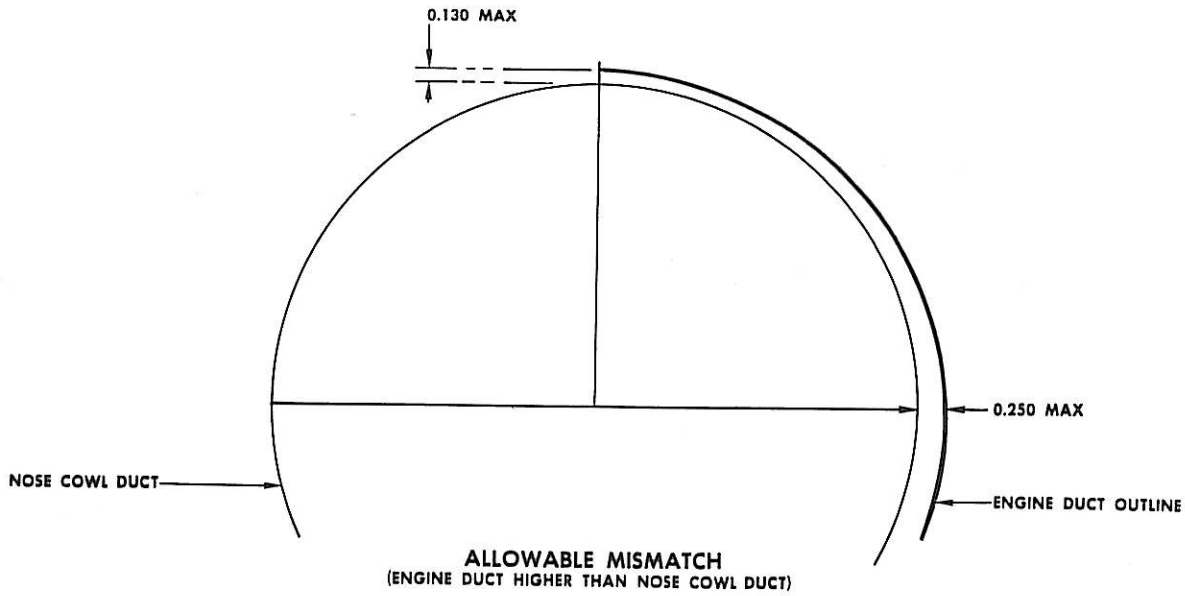




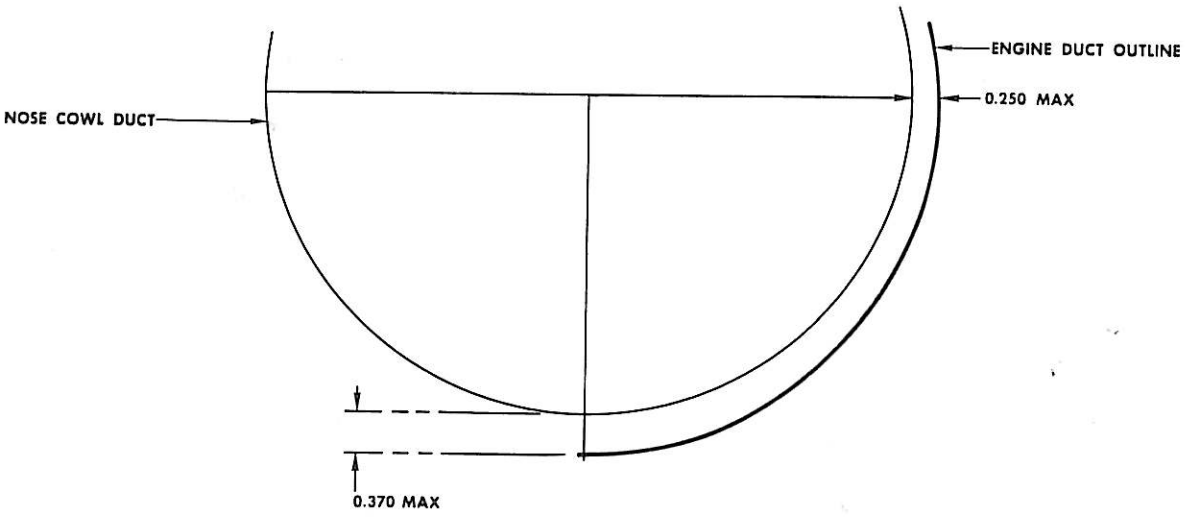
AFT STUB DUCT-ENGINE MOUNTED
VIEW LOOKING DOWN

30.02.51.012-7

(V)

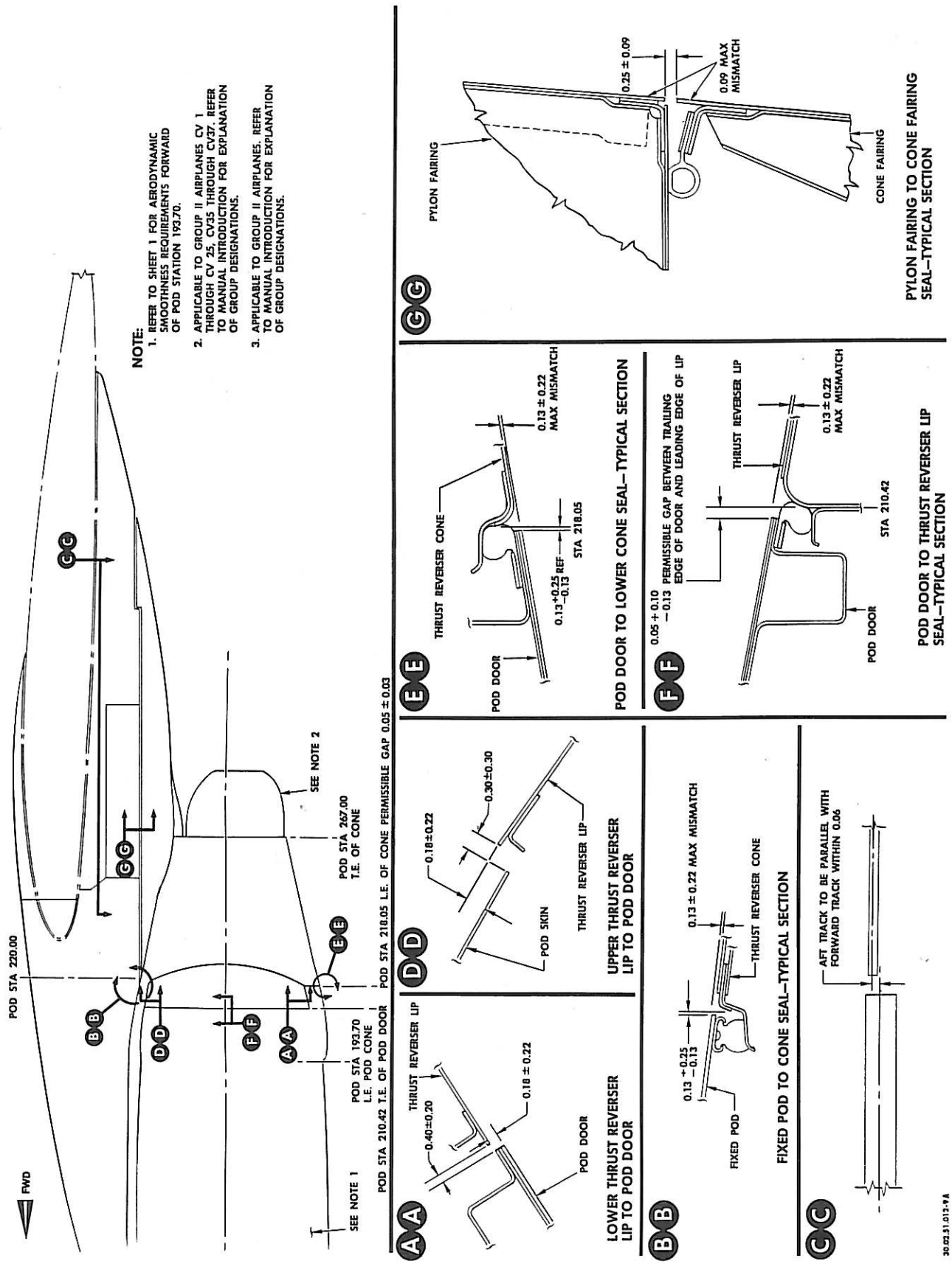


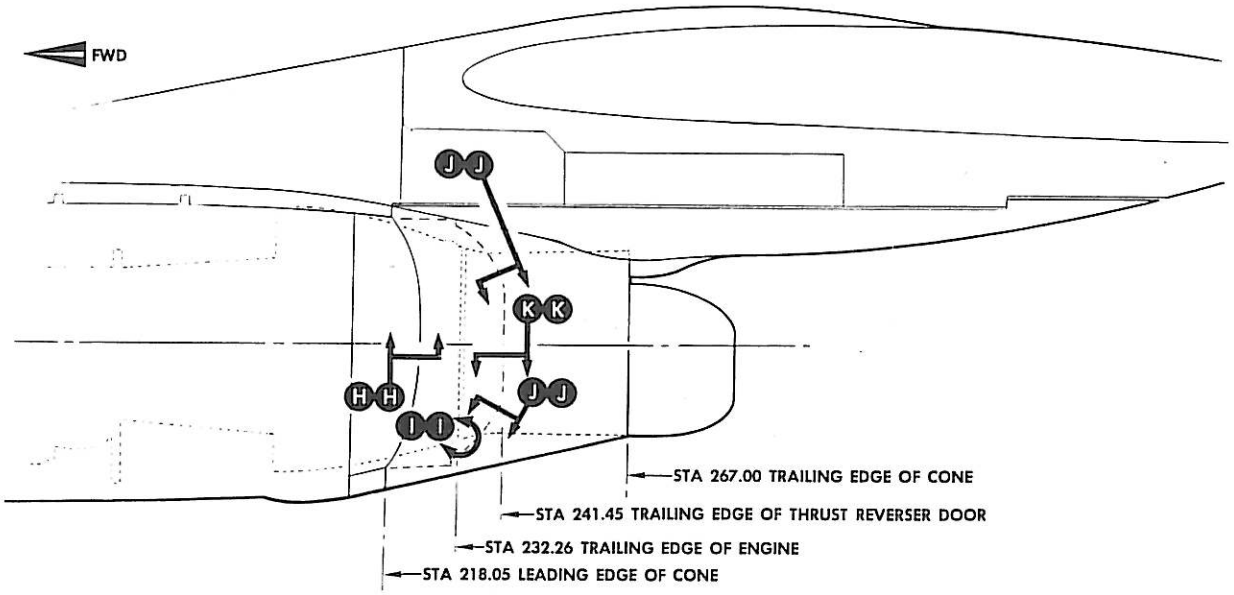
ALLOWABLE MISMATCH
(ENGINE DUCT HIGHER THAN NOSE COWL DUCT)

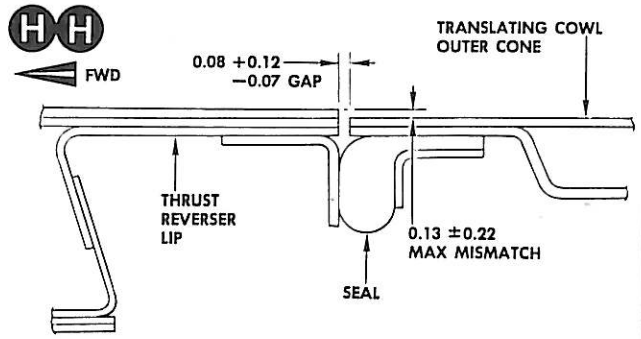


ALLOWABLE MISMATCH
(ENGINE DUCT LOWER THAN NOSE COWL DUCT)

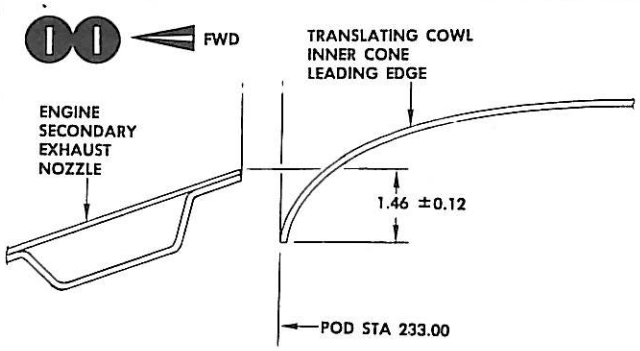
30 02 51 012-8A


NOTE:
1. REFER TO SHEET 1 FOR AERODYNAMIC SMOOTHNESS REQUIREMENTS FORWARD OF POD STATION 193.70.
2. APPLICABLE TO GROUP II AIRPLANES CV 1 THROUGH CV 25, CV35 THROUGH CV37. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.
3. APPLICABLE TO GROUP II AIRPLANES. REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.
FWD
POD STA 220.00
POD STA 193.70 L.E. POD CONE
POD STA 210.42 T.E. OF POD DOOR
SEE NOTE 1
SEE NOTE 2
POD STA 267.00 T.E. OF CONE
POD STA 218.05 L.E. OF CONE PERMISSIBLE GAP 0.05 ± 0.03
AA
THRUST REVERSER LIP
0.40±0.20
0.18 ± 0.22
POD DOOR
LOWER THRUST REVERSER LIP TO POD DOOR
DD
0.18±0.22
0.30±0.30
POD SKIN
THRUST REVERSER LIP
UPPER THRUST REVERSER LIP TO POD DOOR
EE
THRUST REVERSER CONE
0.13 ± 0.22 MAX MISMATCH
POD DOOR
0.13 +0.25 −0.13 REF
STA 218.05
POD DOOR TO LOWER CONE SEAL–TYPICAL SECTION
FF
0.05 + 0.10 −0.13 PERMISSIBLE GAP BETWEEN TRAILING EDGE OF DOOR AND LEADING EDGE OF LIP
THRUST REVERSER LIP
0.13 ± 0.22 MAX MISMATCH
STA 210.42
POD DOOR
POD DOOR TO THRUST REVERSER LIP SEAL–TYPICAL SECTION
BB
0.13 +0.25 −0.13
0.13 ± 0.22 MAX MISMATCH
THRUST REVERSER CONE
FIXED POD
FIXED POD TO CONE SEAL–TYPICAL SECTION
CC
AFT TRACK TO BE PARALLEL WITH FORWARD TRACK WITHIN 0.06
GG
PYLON FAIRING
0.25 ± 0.09
0.09 MAX MISMATCH
CONE FAIRING
PYLON FAIRING TO CONE FAIRING SEAL–TYPICAL SECTION
30.02.51.013-9A

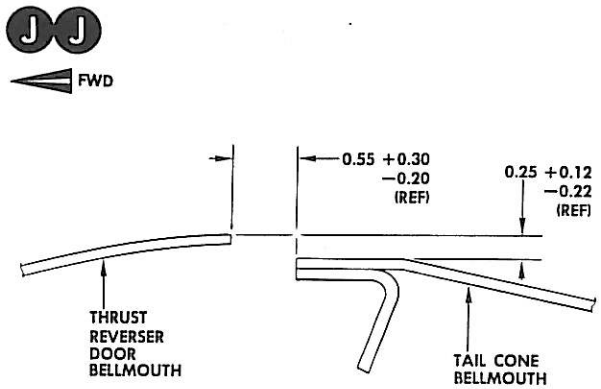




THRUST REVERSER LIP TO TRANSLATING COWL OUTER CONE LEADING EDGE

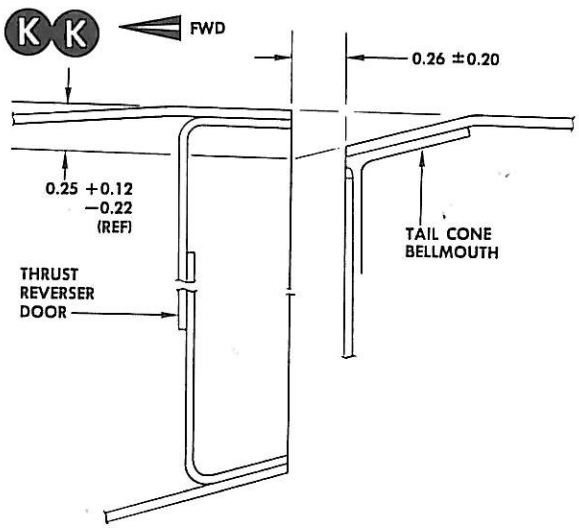


ENGINE SECONDARY EXHAUST NOZZLE TO TRANSLATING COWL INNER CONE LEADER EDGE

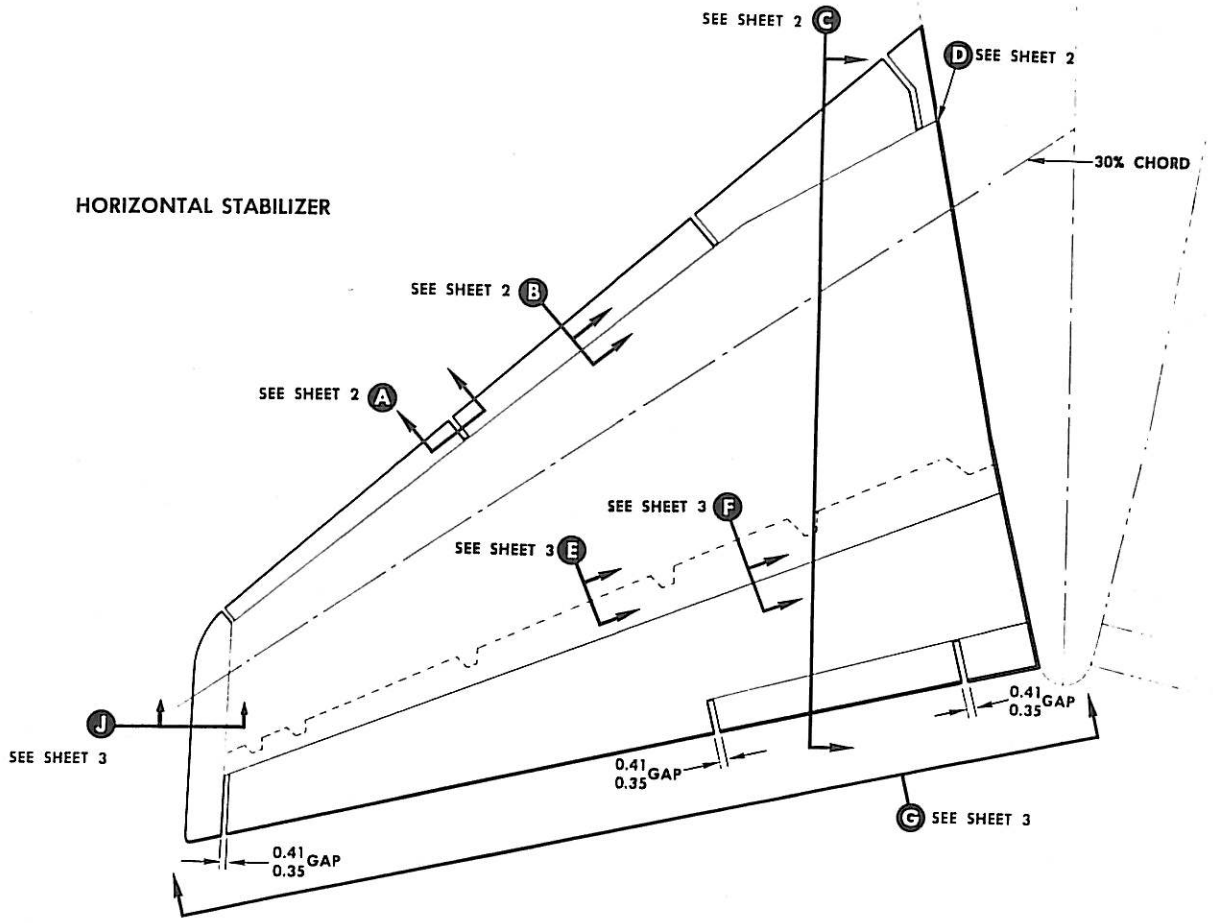


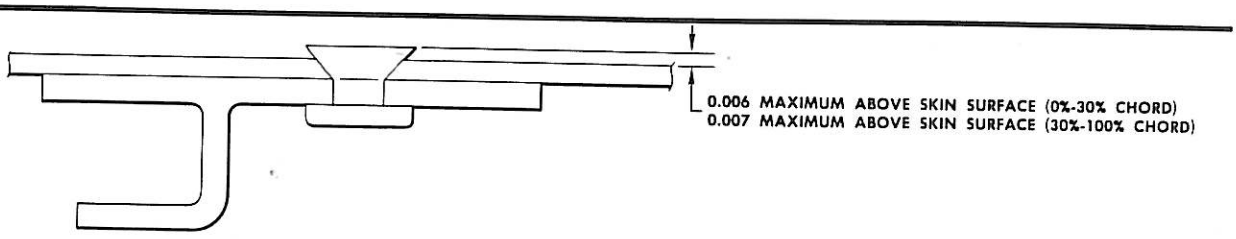
THRUST REVERSER DOOR (UPPER AND LOWER) TRAILING EDGE TO TAIL CONE BELLMOUTH

30.02.51.012-10

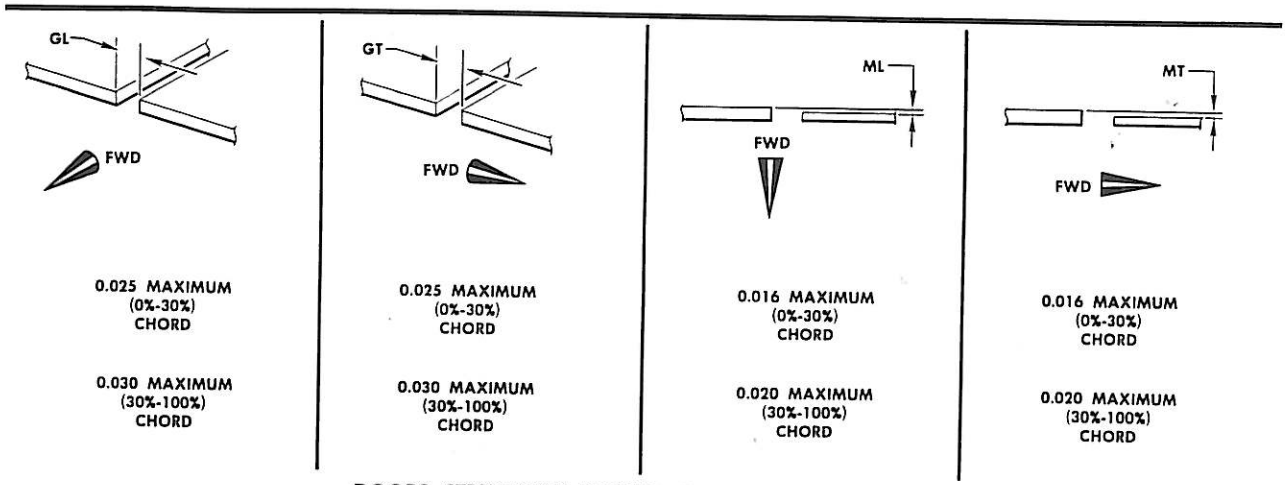


THRUST REVERSE DOOR (HORIZONTAL) TRAILING EDGE TO TAIL CONE BELLMOUTH





MAXIMUM RIVET (INCLUDING BLIND RIVETS) AND SCREW PROJECTION



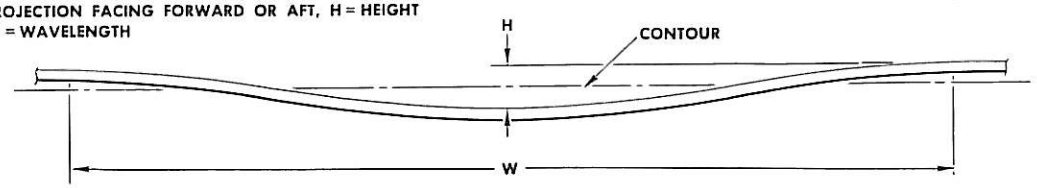
30.02.51.011-1 A

DOORS, STRUCTURAL PANELS, AND SKIN BUTT JOINTS

Aerodynamic Smoothness Requirements,
Horizontal Stabilizer
Figure 5 (Sheet 1 of 3)

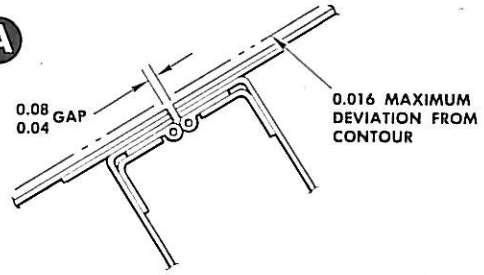
GL = GAP LONGITUDINAL, GT = GAP TRANSVERSE,
ML = MISMATCH LONGITUDINAL, MT = MISMATCH TRANSVERSE,
PROJECTION FACING FORWARD OR AFT, H = HEIGHT
W = WAVELENGTH

H = 0.10 MAXIMUM (W OVER 20.0 INCHES)
H = 0.005 X W (W UNDER 20.0 INCHES)



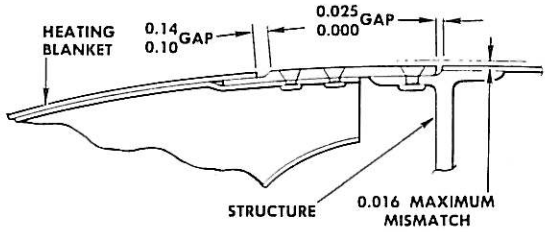
CONTOUR DEVIATIONS

A



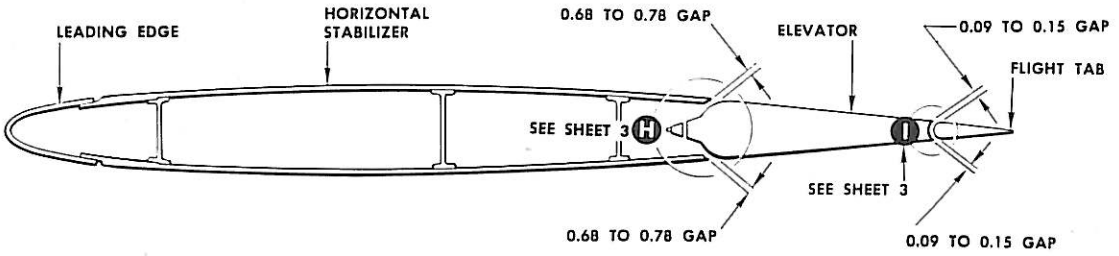
HORIZONTAL STABILIZER LEADING EDGE GAP
(TYPICAL THREE PLACES)

B



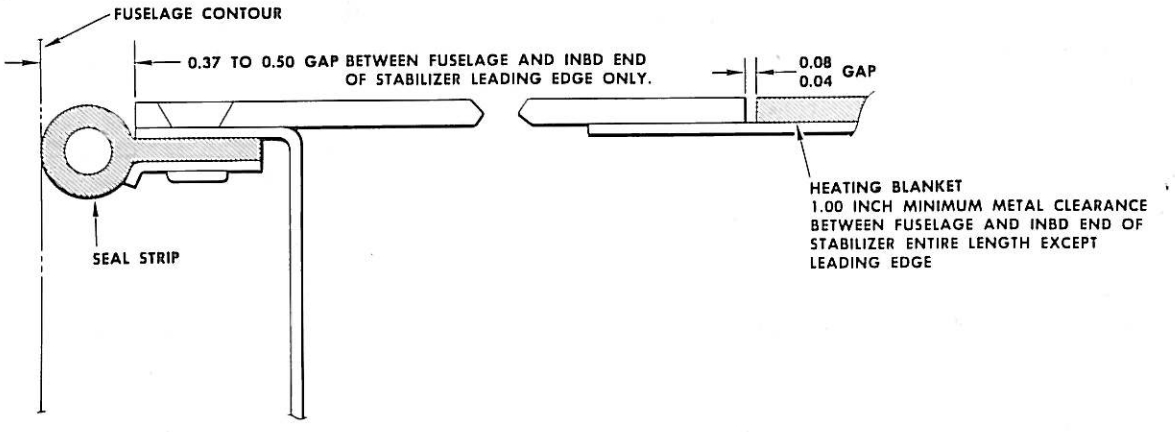
HORIZONTAL STABILIZER LEADING EDGE GAPS
(TYPICAL ALONG ENTIRE LENGTH)

C



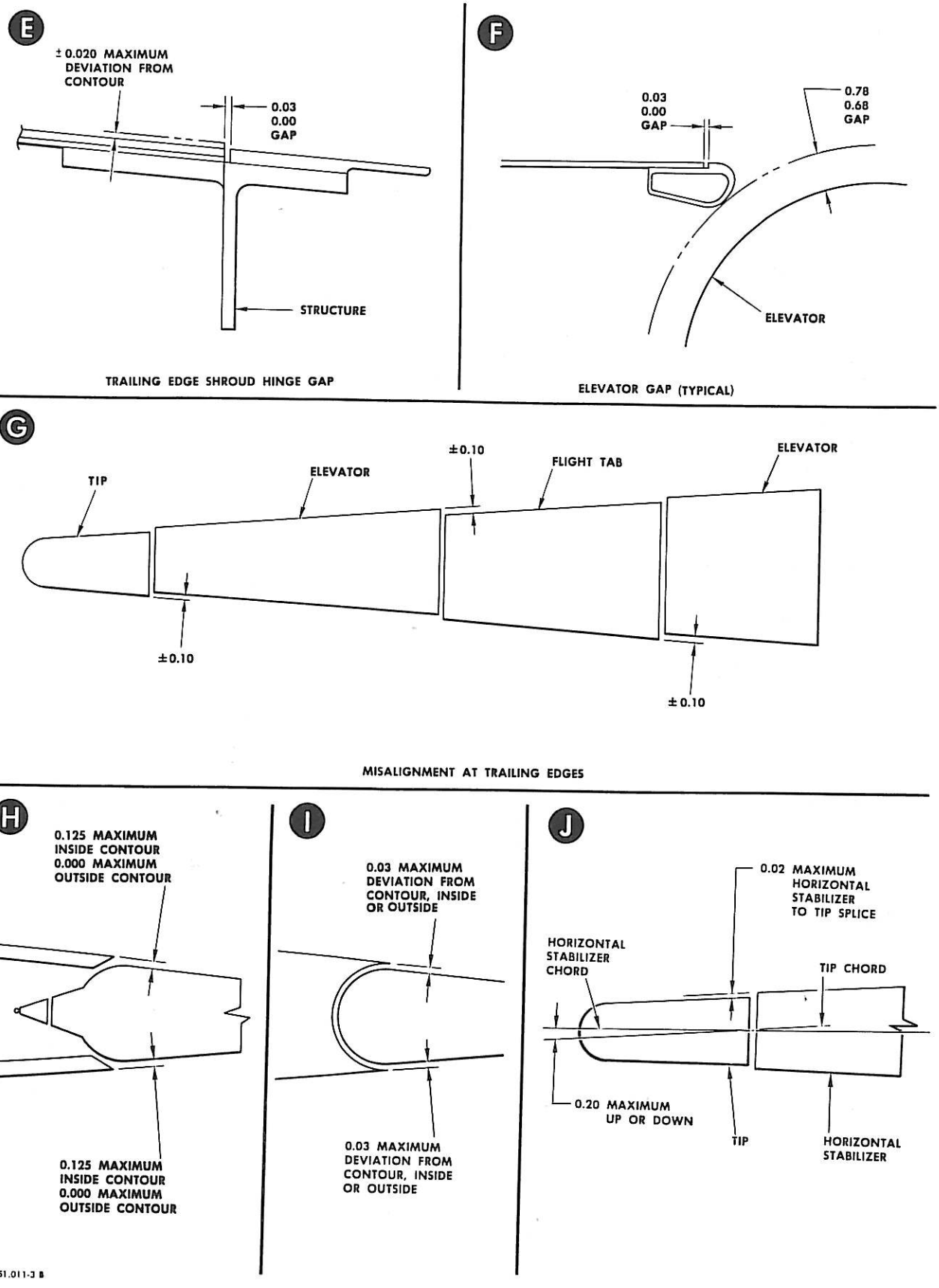
VIEW LOOKING INBOARD

D

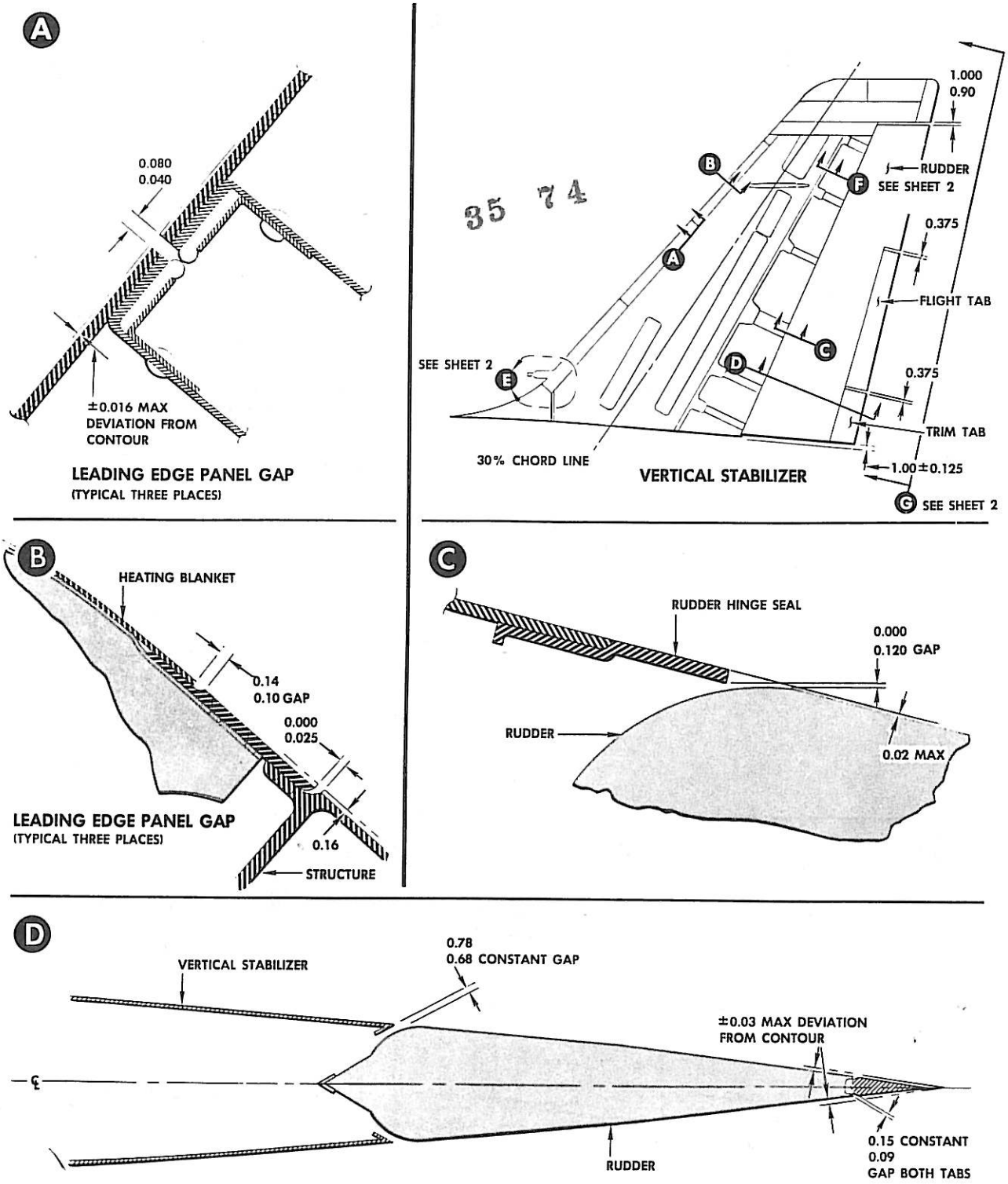


HORIZONTAL STABILIZER—FUSELAGE GAP

30.02.51.011-2 A

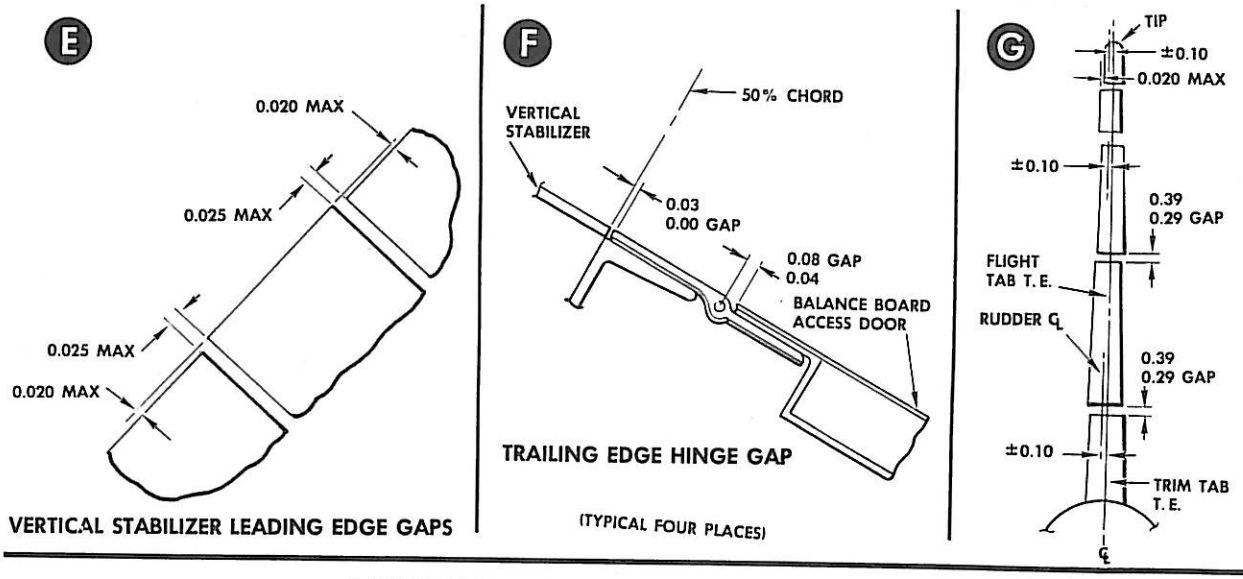


Aerodynamic Smoothness Requirements,
Horizontal Stabilizer
Figure 5 (Sheet 3 of 3)

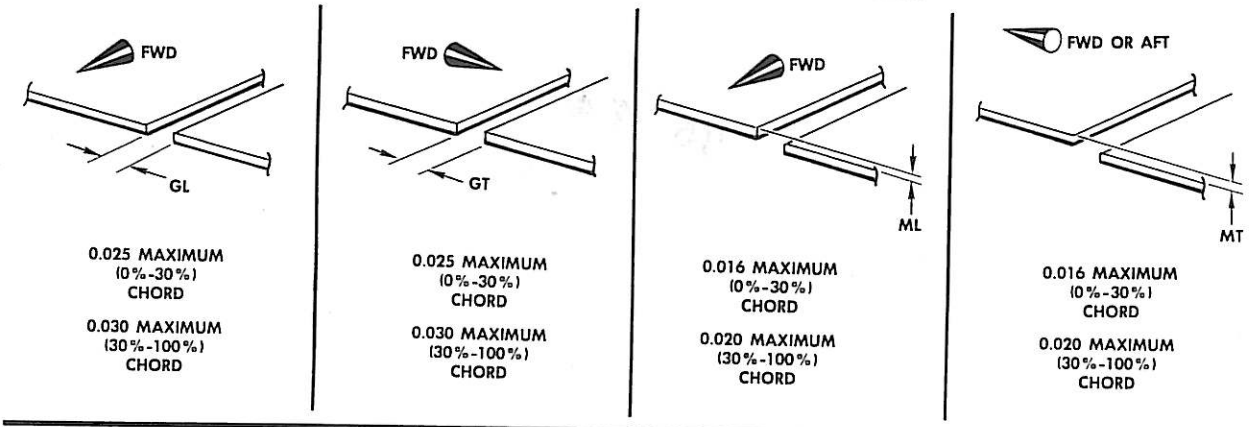


30.02.51.014

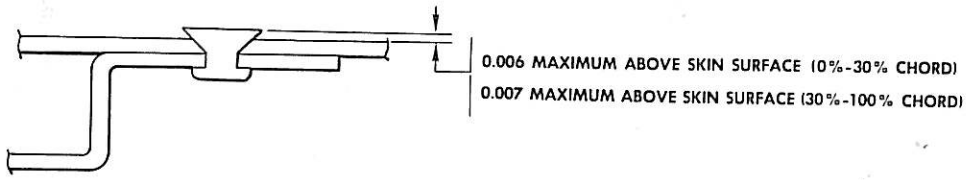
Aerodynamic Smoothness Requirements,
Vertical Stabilizer
Figure 6 (Sheet 1 of 2)



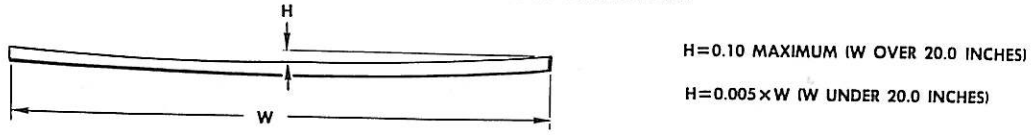
DOORS, STRUCTURAL PANELS, AND SKIN BUTT JOINTS



MAXIMUM RIVET (INCLUDING BLIND RIVETS) AND SCREW PROJECTION



CONTOUR DEVIATIONS



GL=GAP LONGITUDINAL, GT=GAP TRANSVERSE, ML=MISMATCH LONGITUDINAL, MT= MISMATCH TRANSVERSE, PROJECTION FACING FORWARD OR AFT, H=HEIGHT, W=WAVELENGTH

22.02.51.009-5B

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